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Decipher the Effect of Gamification in Harnessing Boredom and Improving Performance

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by

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ABSTRACT

My thesis investigates the effectiveness of gamification in harnessing boredom and improving performance in a repetitive work process. In video games, "loot" rewards are unpredictable, intermittent gains used to motivate players to repeat boring actions. In a 2 X 2 experiment, I examine how loot rewards in point form may impact 1) disengagement, which is an immediate outcome of boredom, and 2) performance in settings where the points have and do not have cash value, respectively. More specifically, I manipulate the level of point reward unpredictability (fixed versus loot) and whether point rewards have cash value (absent versus present).

In the setting where the cash value of point rewards is absent, I hypothesize that loot point rewards have countervailing effects on disengagement. On the one hand, the reinforcement theory of motivation and neuroscience findings on the relationship between dopamine and unpredictable rewards suggest that loot point rewards can reduce disengagement by enhancing individuals' perception of the attractiveness of the repetitive work task. On the other hand, conventional motivation theories (e.g., agency theory and equity theory) predict that loot point rewards may increase disengagement by triggering fairness concerns. My findings support the above expectations. As a result of the countervailing effects, I fail to find a significant difference in either disengagement or performance between the fixed and loot point reward conditions.

When cash value of point rewards is present, consistent with my hypothesis, the positive effect of loot point rewards on perceived task attractiveness is attenuated. However, different from my expectation, cash value does not exacerbate the negative effect of loot point rewards on fairness perception. Despite a lack of significant difference in disengagement between the fixed and loot point rewards conditions, interestingly, there is evidence that performance is higher when loot

point rewards are provided, possibly via other motivational mechanisms I do not capture in my study (e.g., loss aversion).

By disentangling the motivational effect of loot point rewards, I contribute to reconciling the seemingly contradicting insights from conventional motivation theories and neuroscience research. Further, to the best of my knowledge, my thesis is among the first to directly measure disengagement in a scalable work process in a laboratory experiment setting. Lastly, findings from my thesis add to the growing management accounting research on using novel rewards (e.g., gift cards, thank-you notes, charity donation on behalf of employees) to motivate employees. Overall, my thesis informs managers about the possibility of incorporating gamification rewards into repetitive work processes to influence employees' emotional experience and performance at work.

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CHAPTER 1: INTRODUCTION

Gamification, or the use of game elements (e.g., points, badges, levels, avatars, progress bars) in non-game contexts (Deterding et al. 2011b; Nacke and Deterding 2017), is adopted by numerous companies to enhance training and work outcomes (e.g., Baines 2016; Bensinger 2019; Chou 2017; Finances Online 2021; Meister 2013; Meister 2015; Milne 2016; Sayeed and Meraj 2013). For example, to make the mechanical checkout work more interesting, the U.S. retail company Target has incorporated a mini racing game into the checkout process. Cashiers' scanning speed for each product is compared to a predefined optimum scanning speed. If they are faster (slower), their screen flashes green (red) and they win (lose). In recent years, organizations' interest in using gamification to motivate employees has been growing and the trend is expected to continue at an annual rate of 25 to 27 percent over the next five years (Mordor 2021; Finances Online 2021; Technavio 2021). Game elements and mechanics are generally designed to promote emotionally positive and cognitively engaging experiences for users (Deterding et al. 2011a; Landers et al. 2018). Thus, one potential, but relatively less explored, advantage of gamification is for harnessing boredom in the workplace to improve performance. My thesis investigates this research question.

Workplace boredom is a ubiquitous, negative emotional state that employees experience. Multiple global surveys over the past 15 years report that at least 40 percent of the employee respondents are regularly bored at work, regardless of being an entry level staff or a C-suite manager (Emolument 2017; Flaherty 2012; Terrelonge 2017; Udemy 2016). Also, 33 to 40 percent of employees indicate that boredom will be the driver if they seek new employment (CPA Practice Advisor 2017; Korn Ferry Institute 2018). Due to its ubiquity, workplace boredom is frequently mistaken as a trivial and inconsequential matter (Bench and Lench 2013). Yet, its cost is not

negligible. In the U.S. alone, the annual lost productivity from boredom is estimated to be $450-550 billion (Steinhorst 2020).[1]

My thesis examines the effect of a single game element, "loot", on employees' boredom state as well as their performance in a repetitive work process. In video games, loot is random rewards that are used for motivating the repetition of boring behaviors (Lewis et al. 2012). For instance, providing role-playing game players with random dropping of some treasure item to encourage their repetitive defeat of the same monster boss.

In this research, I operationalize loot in the form of point rewards. According to a recent survey, one third of employees indicate that they would like to receive point rewards (Incentive Research Foundation 2020), probably because more and more companies implement marketing strategies and loyalty programs that involve point rewards. Point rewards can be used with or without tangible value attached to them. Sometimes points earned upon completing certain work tasks are accumulated as experience points, which demonstrate an employee's mastery of skills, seniority in ranking, and/or effort invested for reaching a variety of key performance indicators (Eisenhauer 2016; Dishman 2013). Alternatively, points can be redeemed for gift cards, travel products, etc. (Microsoft Teams 2021; Zimmerman 2018).

The efficacy of loot point rewards to mitigate boredom and improve performance in repetitive work processes is based on the reinforcement theory of motivation (Ferster and Skinner 1957) and neuroscience findings regarding how dopamine activity changes in response to unpredictable rewards. Reinforcement theory of motivation describes how the probability of

[1] To compare, depression and anxiety in the workplace are estimated to cost global economy 1 trillion USD in lost productivity. See: https://www.who.int/teams/mental-health-and-substance-use/mental-health-in-the-workplace.

behavior repetition is influenced by when (time interval) and how often (number of required actions completed) the reinforcing rewards are provided to an individual (Ferster and Skinner 1957; Skinner 1938). A reinforcement schedule specifies the way reinforcing rewards are provided. Loot point rewards follow a variable ratio reinforcement schedule, which means that for each repetition of required actions, a reward is given at a certain probability. In line with the theory, this type of reinforcement schedule is found to be effective in motivating behavior repetition. The reason is that dopamine release is negatively associated with reward predictability (Berns et al. 2001; Preuschoff et al. 2006; Schultz 2002, 2007). With unpredictable loot point rewards, dopamine release is boosted, enabling individuals to associate pleasurable feelings such as fun and excitement with conducting the required actions. As a result, boredom should be mitigated, and impaired performance due to boredom can potentially be avoided.

The above reasoning is not without tension. Conventional motivation theories suggest that unpredictable compensation can have negative effects on individuals' motivation. For instance, expectancy theory (Vroom 1964) posits that less predictable outcome decreases the "effort-outcome" expectancy, leading to lower motivation. Likewise, equity theory (Adams 1965) predicts unfair feelings when individuals find their compensation to be disproportionate to their effort, which also points to a negative effect on motivation. Further, according to agency theory (Jensen and Meckling 1976), individuals are on average risk averse. When compensation does not reflect effort contribution very well, a risk premium or ex post pay adjustment must be offered to keep individuals motivated. Taken together, it is unclear how loot point rewards may affect individuals' motivation to perform in repetitive work processes.

To decipher the motivational effect of loot point rewards, I draw on theories from both sides and examine the potential benefit of loot on perceived task attractiveness as well as its

potential cost on fairness perception. Both task attractiveness and fairness perceptions should in turn affect employees' boredom state and performance in repetitive work processes. Given that point rewards may or may not carry monetary value in practice, I examine the above mechanisms in two settings where point rewards have or do not have cash value.

The setting where point rewards do not carry cash value allows me to study the effect of unpredictable rewards independent of tangible value. I hypothesize that, compared with fixed point rewards, loot point rewards can positively impact perceived task attractiveness. I also hypothesize that loot point rewards can negatively affect perceived fairness of point reward scheme.

In the setting where cash value is attached to point rewards, drawing on motivation crowding-theory (see e.g., Deci 1971; Deci et al. 1999; Frey 1994; Ryan and Deci 2000b), I expect to observe a moderating effect that cash value attenuates the above positive effect of loot point rewards on perceived task attractiveness. Further, research on performance-contingent compensation and the brain's interpretation of monetary reward (e.g., Feltham and Xie 1994; Isaac 2001; Murayama et al. 2010; Seymour and McClure 2008) suggest another moderating effect that cash value exacerbates the above negative effect of loot point rewards on fairness perception of point reward scheme.

In both settings, given that the effects on task attractiveness and fairness perceptions are countervailing, I propose research questions on how disengagement will be impacted when individuals are provided with loot point rewards compared with when they are provided with fixed point rewards. To extend the external validity of my research, I also explore how loot point rewards may influence performance in a repetitive task.

I test my predictions and research questions in a 2 x 2 between-subject experiment that manipulates the level of point reward unpredictability (fixed vs. loot) and whether the point rewards carry cash value (absent vs. present). Specifically, loot point rewards are provided at 50% probability, a rate at which dopamine neurons are the most active (Berns et al. 2001; Schultz 2007). I recruit 198 student participants from Wilfrid Laurier University. They complete an online survey that measures their personal traits, demographic and educational information, and gaming experience one week prior to the one-hour experiment session. The experiment session is conducted via Zoom meetings where participants perform 40 minutes of decoding task (Chow 1983).

Consistent with my hypotheses, I find evidence that when point rewards have no cash value, loot point rewards, compared with fixed point rewards, positively influence individuals' perceived task attractiveness, but negatively impact their fairness perception. Due to the two counteracting effects, I do not observe a significant difference in either disengagement or performance between the fixed and loot point reward conditions.

When point rewards have cash value, the positive effect of loot point rewards on perceived task attractiveness is attenuated. This is consistent with my expectation that attaching cash value to point rewards induce a motivational crowding-out effect. Different from my expectation, however, attaching a cash value does not exacerbate the individuals' fairness perception of the point reward scheme. Specifically, similar to points with no cash value, disengagement is not significantly different between the loot and fixed point reward conditions. Interestingly, I observe significantly higher performance when loot point rewards are provided, possibly due to other motivational mechanisms that I do not capture (e.g., loss aversion).

Taken together, my findings indicate that, without monetary value, loot point rewards have some potential for harnessing boredom by making repetitive work processes more attractive, but managers should be cautioned of the possible violation of fairness. With monetary value attached, loot point rewards can improve performance, but through mechanisms that warrant future examination.

The contribution of my study is threefold. First, my research is built on insights from conventional motivation theories (e.g., agency theory and equity theory) and evidence from neuroscience research (e.g., the effect of dopamine). By examining the effect of unpredictable point rewards on both task attractiveness and fairness perceptions, I am able to reconcile these two seemingly contradicting streams of research and provide some evidence to help disentangle the effect of unpredictable rewards on individuals' emotional and work outcomes in repetitive processes. Evidence in my study suggests that if the negative effect on fairness perception can be reined, unpredictable point rewards can potentially be incorporated in performance management systems to reduce employees' boredom in repetitive work processes.

Second, in their study, Presslee and his colleagues (2020) call for future research to adopt more direct measures of (dis)engagement instead of using its proxies (e.g., absenteeism and turnover rate). My study answers their call and investigates (dis)engagement on a more granular level (e.g., disengagement in a particular task), which differentiates from previous survey and field research that examine overall job engagement (e.g., Carrillo et al. 2017; Johnson and Pike 2018; Presslee et al. 2020; Zainol et al. 2016). To my best knowledge, my study is among the first to measure disengagement in a laboratory experiment setting. Despite the fact that I do not observe a significant impact of loot point rewards on disengagement, my findings help to update our

understanding about adopting the gamification technique of loot to harness boredom and mitigate disengagement.

Lastly, my study adds to the steadily growing management accounting research on using novel rewards (e.g., gift cards, thank-you notes, charity donation on behalf of employees) to motivate employees (see Berger et al. 2019; Kelly et al. 2017; Presslee et al. 2020). I propose a different type of novel reward that speaks to recent advisory articles in industry, which suggest using unpredictable rewards to motivate employees (e.g., Blanding 2018; Kopoulos 2017; Kreitner 2020). The novelty of my study is reflected in the following three aspects. First, I highlight the bright side of reward unpredictability and show that the positive mechanism is a determinant of (dis)engagement as important as the negative mechanism in conventional beliefs. Second, my findings suggest that managers can be more open to adopting rewards that only have entertainment value in their control systems. Such rewards may motivate employees simply because they satisfy their psychological needs. Third, I incorporate reward unpredictability in a gamification setting by merging unpredictable game points into a repetitive work process. Different from in daily life, unpredictability is often perceived positively within games. This novel design choice is, therefore, necessary for bringing out the positive effect of reward unpredictability. Overall, by leveraging the principles of gamification into accounting research, my study informs managers about the benefits and caveats of adopting gamification rewards to influence employees' emotional experience and performance in a repetitive work task.

The rest of the dissertation is organized as follows. Chapter 2 establishes the theoretical background of this study. In Chapter 3, I develop my hypotheses and research questions. Chapter 4 describes the research design. My results are discussed in Chapter 5 and conclusion remarks are provided in Chapter 6.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides the theoretical background for my study. In Section 2.2, I discuss the costly emotional issue of workplace boredom. Based on academic work in the fields of neuroscience, psychology, and management, I explain the relationships between boredom, one of its immediate outcomes, disengagement, and performance. I also review prior management accounting research on improving employees' performance in boring work tasks. In Section 2.3, I explain the theoretical foundation of my proposed managerial control, loot point rewards, by reviewing gamification, marketing, psychology, neuroscience, and economics research. Finally, in section 2.4, I provide conclusion for this chapter.

2.2 The Issue of Boredom and Boredom Research

2.2.1 Boredom and its Consequences in the Workplace

In academia, boredom is described as a spontaneous, aversive state of wanting, but unable to engage in desired activities (Eastwood et al. 2012; Willis 2014). When experiencing boredom, individuals may feel depleted and frustrated about being constrained in a meaningless, stagnant moment. Boredom is a commonly felt emotion in the workplace (Washington Post 2005). It is a negative experience shared among employees in various sectors regardless of work shifts or workload, such as mail handlers, call center agents, lab technicians, airline pilots, and senior officials of the U.S. Treasury Department (Postal News 2014; Scopelianos and Keane 2019; The British Psychological Society 2006; The Guardian 2016; Washington Post 2005). In the United States, 43% to 53% of employees feel bored at work and the economic costs of lost productivity from bored workers is estimated to be $450-550 billion per year (Steinhorst 2020).

Prior research indicates that such productivity loss stems from a range of negative outcomes caused by boredom. For example, Pattyn and her colleagues (2008) find that boredom can harm individuals' performance by causing a withdrawal of the supervisory attention system. As a result, individuals react slower and make more mistakes. For the same reason, boredom acts as a stressor in work settings where continued attention is required (Parasuraman and Purohit 2000; Skowronski 2012). Boredom is also associated with a few other short-term negative work outcomes. In a study on developing sustainable workplaces, Cleary and her colleagues (2016) reveal that bored individuals can easily become distracted, which results in errors and decreased productivity. In other studies, boredom is found to induce shirking (Cohen et al. 2007; Wan et al. 2014), procrastination (Blunt and Pychyl 2000) and absenteeism (Kass et al. 2001).

In the long run, as a chronic, pervasive stressor, boredom can undermine employees' work quality (Eastwood et al. 2012). Continued boredom forms a generalized negative attitude about work, which is associated with low job satisfaction (Kass et al. 2001). There is also evidence that connects prolonged boredom with aggressive counterproductive work behaviors, such as abuse, sabotage, production deviance (Bruursema et al. 2011; Todman 2003), and turnover (Korn Ferry Institute 2018). Overall, the consequences of boredom are profound and non-trivial to both individuals and their organizations.

2.2.2 Relationships between Boredom, Disengagement and Performance

Although boredom can be perceived very negatively (e.g., "bored to death") and individuals sometimes are willing to incur considerable costs to alleviate it (e.g., drug and alcohol abuse, see for example, Lee et al. 2007; LePera 2011), it has indispensable evolutionary benefits, which offers key insights in how it can be managed. Since the foraging time of human history,

with limited resources, individuals frequently face the pursuit dilemma between exploitation (repeating actions to gain known but possibly suboptimal benefits) and exploration (experimenting new actions to identify potentially more rewarding opportunities) (Cohen et al. 2007; Geana et al. 2016; Mehlhorn et al. 2015). Information seeking can aid decision making in such "pursuit dilemma". To optimize information seeking, one needs to constantly balance their involvement between exploitative and explorative actions, and boredom plays a key role in this balancing process (Geana et al. 2016; Wilson et al. 2014). Specifically, boredom acts as an adaptive signal to prompt individuals to transition between an exploitative action and an explorative action.

In the present age, the pursuit dilemma in the workplace has become whether to repeat the focal work process (exploitation) or switch to a different process that entails some uncertain benefits (exploration). Being highly predictable, repeating the focal process can be interpreted by one's brain as having very low information value for learning about potentially more rewarding opportunities (Cohen et al. 2007; Hills 2006; Hills et al. 2015; Mehlhorn et al. 2015). Put it differently, in such exploitative processes, there exists a mismatch between an individual's need for cognitive arousal and the availability of cognitive stimulation (Eastwood et al. 2012; Kass et al. 2001; Loukidou et al. 2009).

The primary function of dopamine neurons is to signal the sensations of fun and excitement and induce positive affective states in individuals (Burgdorf and Panksepp 2006; Wang et al. 2013). High predictability can suppress the release of dopamine (Berns et al. 2001; Schultz 2002), making individuals lose interest in repeating the focal process. Consequently, individuals experience dreadful boredom and crave for dedicating high effort to other potentially more rewarding experience. Such desire for exploration drives disengagement from exploitation and prompts

shirking (Cohen et al. 2007). That is, as a key factor in the experience of boredom (Eastwood et al. 2012; Vodanovich and Watt 2016), disengagement is an immediate outcome of boredom.

Disengaged individuals tend to deliver worse performance, because they react slower, become more easily distracted and make more mistakes due to a withdrawal of the supervisory attention system (Cleary et al. 2016; Dorrian et al. 2007; Pattyn et al. 2008). In order to manage their performance, individuals will attempt to self-regulate their concentration on the focal work process using their cognitive recourses that could otherwise be allocated to performing the task (Dorrian et al. 2007; O'Keefe and Linnenbrink-Garcia 2014). Continued maintenance of concentration will eventually exhaust individuals' limited cognitive resources (Baumeister et al. 1998; Muraven and Baumeister 2000; Tice et al. 2007). Taken together, disengaged individuals' cognitive resources are not efficiently used for performing the focal work process, which hinders them from delivering higher performance.

In summary, relying on the pursuit regulating function of dopamine, boredom acts as an adaptive signal to help individuals realize at what point they should disengage from the focal work process and start a different task so that their limited cognitive resources can be utilized in an optimal way. For that reason, boredom cannot and should not be eradicated, but only managed. Knowing how to manage boredom is therefore critical to managers, given the direct impact boredom has on one's executive functions for goal pursuit (Bench and Lench 2013; Eastwood et al. 2012; Loukidou et al. 2009).

2.2.3 Prior Research on Boredom, Disengagement and Performance

As discussed in Section 2.2.1, organizations in multiple sectors face significant economic losses due to employee boredom (Steinhorst 2020). A consensus view across multiple fields of

research, such as psychology, management and neuroscience, is that empirical evidence on workplace boredom, particularly the bored state that individuals experience while conducting a work process, has been quite limited (Baratta and Spence 2018; Bench and Lench 2013; Chan et al. 2018; Gkorezis and Kastritsi 2017; Hunter and Eastwood 2018; Loukidou et al. 2009; Skowronski 2012). Yet, to date, accounting researchers have provided ample evidence on how to enhance employees' performance in boring tasks.

Prior management accounting studies have investigated how a number of motivational mechanisms may affect performance (Bonner and Sprinkle 2002; Schnieder 2018). Two such mechanisms are expectancy theory (Vroom 1964) and agency theory (Jensen and Meckling 1976). Together they suggest that being expected utility maximizers, individuals are more attracted to a compensation scheme that points to a more direct effort-outcome expectancy (Bonner and Sprinkle 2002). Since monetary compensation is often the cornerstone of accounting research on performance management and control, by adopting one or more compensation schemes (e.g., fixed pay, piece-rate), many studies have naturally incorporated those two mechanisms in their design. In addition, they often examine how other performance controls, such as goal setting, performance budgets, relative performance information, contract framing and feedback source, will interact with these compensation schemes and affect performance.

Three related streams of accounting literature examine controls based on goal setting theory (Locke and Latham 1994). The first stream is unilateral goal setting. That is, self-selected goals by subordinates (e.g., employees) or assigned goals by supervisors (e.g., experimenters). Studies in this stream generally find that goal levels positively motivate performance in repetitive tasks. However, when the goals are too difficult, unintended consequences may arise, such as less efforts invested in the detection of production efficiencies (Webb et al. 2013) or quitting (Sprinkle

et al. 2008). In addition, when goals are moderately (vs. highly) difficult, ex post goal adjustments help (do not help) to motivate individuals' performance in repetitive tasks (Kelly et al. 2015).

The second stream is performance budget-based, negotiable goal-setting that involve both the subordinates and their supervisors. Accounting researchers have discovered that using performance budgets for both resource (e.g., work time) allocation and performance assessment can motivate subordinates' performance in repetitive tasks (Fisher et al. 2002b). However, supervisor-imposed budgets following a failed budget negotiation can significantly harm subordinates' performance, because the budgets are perceived as unfair by subordinates (Fisher et al. 2000; Fisher et al. 2002a).

The last stream of research focuses on settings where multiple goals are salient. In such cases, individuals are found to perform better when their financial compensation is based only on one performance goal (e.g., speed) while receiving feedback on other goals (e.g., accuracy, quality) (Christ et al. 2012; Christ et al. 2016; Kachelmeier et al. 2016).

Relative performance information (RPI) is also a factor examined by accounting researchers in repetitive task settings. It is rooted in the motivation theory of social comparison (Festinger 1954). Wang (2017) finds both productive and counterproductive efforts are motivated by RPI-based nonpecuniary recognition. Further, other motivators such as a promotion opportunity can be used together with RPI to motivate performance (Chan 2018). The RPI mechanism has also been studied in tournament settings, where a number of factors have been identified to influence individuals' performance in repetitive tasks in tournaments, such as tournament group identity, winner proportion, tournament horizon and the level of heterogeneity in individuals' ability (Berger et al. 2019; Kelly and Presslee 2017; Kersting et al. 2019). In addition, contract framing

(bonus vs. penalty) and feedback source (peer vs. supervisor) can impact individuals' performance in repetitive tasks (Church et al. 2008; Holderness Jr et al. 2017).

With respect to accounting research on (dis)engagement, both surveys and field studies have been conducted. The surveys explore the overall job engagement of Certified Public Accountants. Determinants of job engagement in those surveys include environmental variables, such as time pressure that is inherent to the profession, and corporate social responsibility commitment (e.g., Carrillo et al. 2017; Low and Spong 2021; Johnson and Pike 2018). Field studies examine employees' general engagement at work. For example, Li and Sandino (2018) investigate, in the retail industry, whether an information sharing system that records employees' creative work can affect their job engagement. Presslee and his colleagues (2020) examine, in the fast food sector, how recognition (e.g., thank-you cards from the management) may impact outcomes of disengagement, such as absenteeism and turnover rate. Zainol and her associates (2016) report how to boost engagement by strengthening manager-employee relationships.

My thesis joins the above studies in adding to accounting research on (dis)engagement. It examines whether an emerging technology, gamification, has the potential to be a managerial control that mitigates the counter productive emotional state of boredom in a repetitive work process. This mechanism is different from those used in previous studies. However, some evidence from the field indicates that gamification can be motivating (e.g., Kelly et al. 2021).

2.3 Using Gamification to Harness Boredom and Improve Performance

2.3.1 Gamification in the Workplace

Gamification is defined as using game elements (e.g., virtual rewards such as points, levels, badges) in non-game contexts (Deterding et al. 2011b; Nacke and Deterding 2017). Over the past

decade, real life tasks in various domains and skill levels have been gamified: gamification is used by Microsoft to increase the productivity of Dynamics 365 software users, by PwC to enhance new hires' onboarding experience, by Walmart to improve safety training effectiveness, by NTT DATA Corporation to promote internal collaboration, by Amazon to boost efficiency of warehouse workers, and by McDonalds to train store managers' decision making skills (Baines 2016; Bensinger 2019; Meister 2015; Milne 2016; Sayeed and Meraj 2013). More and more enterprise gamification systems have been registered as patented control tools for engaging and rewarding employees at work (e.g., Jakowski and McKellar 2014; Palmer 2012). The global market of gamification was valued at a minimum of 9.1 billion US dollars in 2020 and it is expected to grow at an annual rate of 25 to 27 percent over 2021 to 2026 (Finances Online 2021).

As a disruptive technology, gamification greatly facilitates work redesign. It makes work redesign easier for managers of various backgrounds and skills for two reasons. First, game elements are created for providing players with emotionally positive and cognitively engaging experiences (Deterding et al. 2011). The cases of NTT DATA Corporation and Amazon demonstrate that gamification is inherently advantageous when applied to improve processes. NTT DATA Corporation implements an online enterprise gamification platform that incorporates multiple game elements to improve key business processes such as knowledge sharing and relationship building between its employees around the world. The game elements give employees a sense of purpose in the otherwise boring work processes. As a result, collaborative activity on the platform has significantly increased (Sayeed and Meraj 2013). Similarly, gamification can make package stacking at the warehouse fun and meaningful for Amazon workers. In a Tetris-like game, their physical action of stacking is registered in real-time, turning their work performance

into game performance, based on which workers receive virtual points and badges throughout their shift (Bensinger 2019).

Second, gamifying a work process does not necessarily change its operation or the required action(s) for completing the job. Gamification modifies employees' behavior by refining existing work processes (c.f. Landers et al. 2018). For example, the U.S. retail company Target has turned its in-store checkout process into a mini racing game, in which cashiers race the scanning of each item against a predefined optimum scanning speed. If they win, their screen flashes green. If they are slower, the screen flashed red. Target's gamification not only increases cashiers' short-term performance, but also encourages sharing and learning winning techniques among them, which in turn helps to improve their long-term performance (Mason 2018). Overall, gamification is believed to have the potential to revolutionize work processes including, but not limited to, recruiting, onboarding, corporate leadership training, creative thinking and innovation management, and human resource compliance (Mordor 2021; Spanellis 2019).

2.3.2 Gamification Research and Loot Rewards

In contrast to the abovementioned prevalence of gamification in industry, gamification has received limited attention in business research. Companies have been investing millions of dollars to incorporate gamified rewards in their incentive systems, yet academic evidence on the effects of specific gamified rewards for motivating work outcomes is limited and inconsistent due to contextual factors. For example, qualitative studies generally conclude that the effect of gamification is manifold, and most quantitative studies only find partial evidence of the expected associations between game elements and outcomes (Hamari et al. 2014). Further, engagement in various consumer and educational online tasks can be enhanced using game elements, but nearly

half of the time, the positive effect does not sustain (Looyestyn et al. 2017). Gamification in existing business research has mainly focused on learning outcomes; for example, classroom learning (e.g., Gómez and Monroy 2018; Moncada and Moncada 2014; Zhao 2019) and corporate training (Baxter et al. 2016, 2017; Kelly et al. 2021).

Noteworthy, the effects of gamification on learning outcomes may be different from its effects on performance outcomes. This is because a learning process draws individuals' attention to the mastery of the process (e.g., by discovering effective strategies and analyzing relevant information), while in a performance process, the relationship between effort and outcome is more straightforward and, therefore, individuals' motivation depends more on the end result (Latham and Seijts 2016; Seijts and Latham 2005). Thus, there is reason to believe that the prior findings obtained in learning settings may not apply in work settings. Building on neuroscience and psychology theories, my study aims to add to gamification research by examining how gamification may affect work experience and performance outcomes when the focal task tends to trigger the costly emotional state of boredom. Specifically, I consider the use of loot, a type of gamified, unpredictable reward to redesign a repetitive work process.

Loot rewards are found in video games as unpredictable, intermittent rewards a player can receive for completing repetitive tasks, e.g. repeatedly defeating the same enemy in the hope of "looting" a valuable dropping from the win (Lewis et al. 2012). In practice, the loot mechanism is applied to motivate consumers as well as employees, sometimes as inconspicuous as a drag on a screen. For instance, "Pull-to-refresh" is a design that refreshes the contents of a screen upon a downward "pull" gesture on the screen. Because seeking and receiving information is a satisfying human instinct, the latest content appears after the pull positively stimulates the brain. Compared with an automatic load of new content, the "pull-to-refresh" way provides users an opportunity to

play a mini game with unpredictable amount of new content as the prize (Lewis 2017). Although users cannot predict how many new "likes" for a posting, or what news, videos or product listings they will see after each pull on the screen, the innate optimism gives them hope (c.f. Goldsmith and Amir 2010). As a result, many users are tempted to repeatedly pull to refresh, regardless of the outcome. This seemingly redundant design is so successful that it becomes a basic feature of many mobile applications. Twitter was even granted a patent on it (Patel 2013).

Another example of the loot mechanism observed in business contexts relates to an emotion being sold as part of a product – surprise. Kinder Eggs and Pokémon booster packs are both successful "surprise" products for children. Customers can also purchase surprises by subscribing to monthly mystery box delivery (Redick 2013). For those who only want to have the pleasure for free, there are millions of unboxing videos online that can make them just as excited and satisfied (Kelly 2014). According to YouTube, people watch videos with unveiling items more than 1.1 billion times within a year, which comes to a total of 60 million hours (Hof 2015). Surprises are considered as one of the most successful marketing tools (Redick 2013; Top Trend 2019). They are "doses" of entertaining exploration that help to invigorate individuals who are tired of performing predictable, exploitative daily routines.

The loot mechanism is also seen in work contexts. Some companies adopt a virtual gambling slot machine with loot type of unpredictable rewards to motivate employees' voluntary participation in daily training (Kelly et al. 2021). Specifically, employees earn points from completing training modules and the points can be used to gain gift cards either through online auction or an online slot machine. Despite auctions being the more economically efficient use of points, as Kelly and her colleagues (2021) show, half of the employees choose to spend the points in fun game play to win the cards.

Overall, loot type of rewards has been used by companies to motivate repetition of various behaviors. Yet, research on how they may motivate employees is scarce, compared with that which focuses on motivating consumers. In their recent study, Kelly and her colleagues (2021) note that their study is the first to show that incorporating a game with loot type of rewards (e.g., a slot machine) can motivate employees' engagement and effort in training tasks at work. My study thus helps to fill that paucity.

2.3.3 Relationships between Loot Rewards, Reinforcement Theory of Motivation and Employee Compensation

The efficacy of loot is based on reinforcement theory of motivation (Ferster and Skinner 1957). Academic research on motivating behavior repetition can be traced back to the law of effect proposed by Edward Thorndike more than one century ago, which predicts that behaviors that lead to a satisfying (discomforting) effect in a specific situation are more (less) likely to be repeated in the same situation (Thorndike 1898). Ferster and Skinner subsequently extend Thorndike's work by developing reinforcement theory of motivation. The theory explains how incentives provided at various time intervals or upon the completion of different numbers of required behaviors can influence the probability of behavior repetition (Ferster and Skinner 1957; Skinner 1938).

Derived from reinforcement theory of motivation are reinforcement schedules (Ferster and Skinner 1957; Schoenfeld et al. 1956), which include interval and ratio schedules. They specify the occurrence of a reinforcing outcome (e.g., a reward or omission of a punishment) in relation to the completion of required behaviors. To be specific, reinforcing outcomes that follow an interval schedule are defined based on the time elapsed between two consecutive outcomes, and reinforcing

outcomes that follow a ratio schedule are defined based on the quantity of required behaviors completed between two consecutive outcomes.

Within each of these two categories, there are fixed and variable schedules. For example, for interval schedules, the time elapsed between two consecutive outcomes can be fixed ("fixed interval schedule") or variable ("variable interval schedule"). A monthly salary is an example of a fixed interval schedule because employees receive income according to their time in position rather than their repetition of certain work tasks. Stock options are an example of a variable interval schedule because the best time for employees to exercise their options and cash in the shares varies depending on the market condition. Similarly, for ratio schedules, there may be a fixed ("fixed ratio schedule") or variable ("variable ratio schedule") number of required actions between two consecutive outcomes. For example, piece-rate pay follows a fixed ratio schedule, because employees are rewarded for every single completion of a work process. An example of variable ratio schedule can be found in academia where faculty are given a bonus for a successful paper publication, as the number of submissions required before receiving that bonus often varies.

Ratio schedules are found to be more effective in motivating required behavior than interval schedules (see reviews by Bucklin and Dickinson 2001; Hantula 2001). More importantly, prior research has established that while all four types of reinforcement schedules can be used to motivate employees, variable ratio schedule is the most effective type. Scholars frequently observe a counterintuitive phenomenon that reinforced behaviors persist longer when intermittent rather than consistent reinforcing rewards are offered (the "partial reinforcement extinction effect", see Mackintosh 1974). In fact, when the rewards follow a variable ratio schedule, there is a chance that the persisted behaviors become an addiction, such as gambling (e.g., Harrigan et al. 2010; James et al. 2016).

Findings in neuroscience research provide some explanation to this puzzling phenomenon. With a variable ratio schedule, individuals are not guaranteed to receive a reinforcing reward upon every single repetition of required behaviors. In other words, the rewards are given at a probability. Dopamine regulates behavior repetition in response to changes in the probability of reinforcing rewards (Preuschoff et al. 2006; Schultz 2002, 2007). Specifically, the activity of dopamine is negatively related to reward predictability (Berns et al. 2001; Fiorillo et al. 2003; Schultz 2007). That is, the less predictable reinforcing rewards are, the more active dopamine neurons will be, which means the more pleasure individuals will feel, and the more they desire to repeat the behaviors. As discussed in Section 2.2.2, this regulatory process of dopamine is for optimizing information seeking to balance the "pursuit dilemma". When the rewards are less predictable, there exists an information gap regarding how reinforced behaviors lead to a reward. It is an explorative pursuit. From each repetition of the reinforced behaviors, individuals observe and learn important information about the behavior-outcome association to fill that gap (Steinberg et al. 2013).

Despite being a powerful tool for behavior modification, employee compensation based on a variable ratio schedule have received little scholarly attention over the years (Rubin and Sheremeta 2016). This is because many conventional motivation theories suggest negative impacts of unpredictable compensation on individuals' motivation. For example, expectancy theory (Vroom 1964) states that the "effort-outcome" expectancy is associated with individuals' motivation in performing a task. As utility maximizers, individuals are more motivated when the "effort-outcome" expectancy is higher than when it is lower (Bonner and Sprinkle 2002; Kanfer 1990). Since increased unpredictability reduces the "effort-outcome" expectancy, unpredictable compensation is expected to be less motivating than predictable compensation.

In a similar vein, equity theory (Adams, 1965) posits that individuals feel unfair and dissatisfied if they believe the outcome of their effort is disproportionate to their effort. When effort is consistent, but compensation is unpredictable, the effort-outcome relationship could be perceived as unfair. Likewise, agency theory (Jensen and Meckling, 1976) proposes that individuals are generally risk averse and expect performance evaluation to be an adequate reflection of their effort (Indjejikian 1999; Ittner and Larcker 2002). When performance measures are noisy, and compensation does not reflect effort contribution, individuals tend to demand a risk premium or ex post pay adjustment to make up for their effortful input (Bol 2008; Bol et al. 2015; Bonner and Sprinkle 2002; Indjejikian 1999).

Overall, theories do not clearly predict the efficacy of employee compensation that follow a variable ratio schedule, and it is not until recently that researchers have started to empirically evaluate the potential of compensating individuals with unpredictable rewards. Typically, it involves offering tangible rewards (e.g., cash and gift cards) at a probability between 0-100% (e.g., Kelly et al. 2021; Shen et al. 2014; Shen et al. 2019). Those research endeavours have mainly focused on contexts of corporate training and physical challenges in daily life (e.g., physical exercise). Different from those studies, I evaluate the feasibility of using gamification rewards based on a variable ratio schedule to enhance work experience and outcome in repetitive processes.

2.3.4 The Effectiveness of Loot Point Rewards in Harnessing Boredom and Improving Performance

As mentioned in Section 2.3.1, game elements are designed to bring emotionally pleasant and cognitively engaging experiences to players (Deterding et al. 2011b). Besides the innate appeal of gamification, there are three other aspects of loot point rewards that point to their effectiveness

as a managerial control in harnessing boredom and impacting performance in a repetitive work process.

First, both theory and empirical evidence suggest that resolving uncertainty is rewarding regardless of the outcome. From a theoretical perspective, since loot point rewards follow a variable ratio schedule, they function as an explorative component of a repetitive work process, adding an information gap between required work behaviors and their rewards. Resolving the uncertainty embedded in loot point rewards (e.g., by repeating required behaviors and observing the outcome) can help to fill the information gap. Because information seeking is regulated by dopamine (see Section 2.3.3), individuals are rewarded with pleasurable excitement for repeating required work behaviors whether they receive loot points or not. This means that individuals are less likely to experience boredom resulted from suppressed dopamine release in the repetitive work process (see Section 2.2.2). Empirical research also corroborates that realizing an uncertain outcome is satisfying (Shen et al. 2019; Hsee and Ruan 2016). Taken together, loot point rewards can possibly harness boredom and mitigate disengagement in repetitive work processes.

Second, loot point rewards can potentially make repetitive work process (e.g., procedure) more salient than its outcome (e.g., monetary payoff). Game elements and mechanisms are advantageous of making hypothetical, abstract settings vivid and engaging, yet they are only meaningful within the game world. In other words, they support enriching the playing process instead of outcome. There is evidence that when individuals focus on the process of a pursuit rather than its outcome, unpredictable rewards can be more motivating than predictable rewards of higher expected economic value (Shen et al. 2014; Shen et al. 2019). I expect loot point rewards to have similar motivating effects in my study.

Third, given that individuals can perceive unpredictable compensation negatively, as predicted by conventional motivation theories (see Section 2.3.3), it is essential to incorporate gamification when offering unpredictable rewards to employees. This is because, in game contexts, unpredictability often has a positive connotation. From a game design perspective, unpredictability implies pleasurable excitement (Westera et al. 2008) and the potential to satisfy players' explorative desire (e.g., curiosity) (Chou 2015; Ruan et al. 2018), which then induces fun and enjoyment (Nagle et al. 2014).

Overall, considering that multiple conventional motivation theories (e.g., Adams 1965; Jensen and Meckling 1976) propose seemingly contradicting predictions to those derived from psychology and neuroscience theories, and that compared with many game elements such as 3D animation and immersive audio effects, gamified rewards like points and badges are the least interesting part of a game (Nicholson 2012; Robertson 2010), it remains an empirical question whether gamified, unpredictable rewards such as loot points have the expected potential in mitigating boredom and enhancing performance in repetitive work processes.

2.4 Conclusion

In this chapter, I discuss the theoretical grounding for my study by reviewing literature from multiple disciplines. Specifically, I describe the issue of boredom in the workplace, its association with repetitive work processes and relationships with variables related to productivity, such as disengagement and performance. As a costly, ubiquitous emotion that has only received limited scholarly attention, boredom carries evolutionary significance, which provides insights in its management. Following those insights, I identify gamification as a potential managerial control

for mitigating boredom because game elements are developed to induce positive affects, which facilitates work redesign. Also, gamifying a work process needs not change its operation.

According to prior psychology and neuroscience research, rewards that follow a variable ratio schedule are particularly effective in motivating behavior repetition, because they promote dopamine release, which then induces pleasurable excitement. Thus, I propose to use the gamification technique of loot point rewards to mitigate boredom in the repetitive work setting of this study. Loot point rewards have the benefit of highlighting the process (vs. outcome) of a task, which, based on empirical evidence, presumably attracts individuals more than predictable point rewards. Despite the above arguments, conventional motivation theories suggest that loot type rewards can be demotivating. Hence, careful examination as to the efficacy of loot point rewards is important. In the upcoming chapter, I develop my hypotheses and research questions.

CHAPTER 3: HYPOTHESES DEVELOPMENT

3.1 Introduction

In this chapter, I draw on motivation theories from multiple disciplines, including neuroscience, psychology, management, and economics, to extrapolate the effects of loot, a type of unpredictable point rewards, on individuals' disengagement and performance in a boring task. In particular, I argue that the unpredictability of point rewards influences individuals' disengagement by varying their perceived task attractiveness and perceived fairness of point reward scheme. To enhance the external validity of the study, I also examine the effect of loot point rewards on performance.

I investigate the above mechanisms in two contexts where cash is either attached or not attached to the unpredictable loot point rewards. As discussed in Section 2.3.2 and Section 2.3.3, both gamification and unpredictable reward research is scarce. To the best of my knowledge, prior studies have only focused on unpredictable cash rewards (e.g., Shen et al. 2014) and fixed point rewards that carry monetary value (e.g., Kelly et al. 2021) . Different from previous research, my study examines the effects of unpredictable point rewards more comprehensively and attempts to explain the causal relationships between unpredictable point rewards and an immediate outcome of boredom, disengagement, as well as performance.

The rest of the chapter is organized as follows. In Section 3.2, I develop hypotheses regarding the effects of point reward unpredictability on disengagement when cash value of point rewards is absent. In Section 3.3, I discuss these predictions in the context where cash value of point rewards is present. In Section 3.4, I present research questions that explore the effect of point reward unpredictability on performance. Chapter conclusion can be found in Section 3.5.

3.2 The Effect of Point Reward Unpredictability on Disengagement When Point Rewards Do Not Have Cash Value

First, I examine the effect of point reward unpredictability on individuals' perceived task attractiveness. To develop my hypothesis, I draw on research in neuroscience that examines how the human brain responds to unpredictability. More specifically, neuroscience research points to the effect of dopamine in settings where rewards are unpredictable.

Further, neuroscience research has consistently found that unpredictability stimulates the release of dopamine (e.g., Cohen et al. 2007; DeYoung 2013; Schultz 2007). The reward regions of one's brain are generally more active when less predictable rewards are received (Berns et al. 2001). Specifically, dopamine neurons are the most active when rewards are the least predictable, which is at 50% probability (Linnet 2014; Preuschoff et al. 2006; Schultz 2007). That is, individuals' feelings of fun and excitement produced by active dopamine neurons are the most intense when they receive rewards only half of the time.

Based on the above findings, I expect that unpredictable point rewards prompt individuals to spontaneously feel that the repetitive task is fun and exciting. Further, feelings of fun and excitement are among the key determinants of perceived task attractiveness (Bonner and Sprinkle 2002; Cruz et al. 2000; Fessler 2003; Scott Jr and Erskine 1980). Therefore, I anticipate unpredictable point rewards to increase individuals' perceived task attractiveness.

This prediction is also consistent with research on gamification that shows game elements are designed to provide players with emotionally positive and cognitively engaging experience (Deterding et al. 2011b). Overall, I expect point reward unpredictability to increase individuals' perception of task attractiveness. My first hypothesis is stated as follows:

H1: During a repetitive work process, individuals perceive the task as more attractive when they are provided with unpredictable point rewards than when they are provided with predictable point rewards of the equivalent amount.

In my first hypothesis, I establish my expectation that point reward unpredictability will increase individuals' perceived task attractiveness. Next, I consider how point reward unpredictability will affect individuals' perception of fairness.

Prior research in psychology and management suggests two factors that negatively impact how individuals may perceive the fairness of an unpredictable reward scheme. The first factor is the effort-reward ratio. When working under an unpredictable reward scheme, the outcomes can be favorable, where individuals receive their expected rewards, or unfavorable where they miss out the rewards. This means that the effort-reward ratio is sometimes unbalanced. According to equity theory (Adams 1965), when there is a disproportion between effort and reward, individuals' may feel that fairness is violated. Therefore, in cases that unfavorable reward outcomes are realized, individuals likely perceive the rewards as disproportional to their effort investment and experience decreased perceived fairness.

The second factor that influences fairness perception when the rewards are unpredictable pertains to individuals' intensified need for fairness when feeling uncertain (Van den Bos 2001). Uncertainty management theory proposes that individuals appear to use fairness as a coping strategy for uncertainty (Van den Bos and Lind 2002). Specifically, when facing uncertainty, individuals evaluate whether they can trust an organization not to exploit them by verifying whether or not the organization is generally fair (Tyler and Lind 1992). Put differently, concerns with uncertainty intensify individuals' need for fairness feelings. As a result, individuals are more

inclined to search for cues that help them make fairness judgments and judge more frequently to ease their fairness concerns (Lind and Van den Bos 2002; Van den Bos et al. 1998). In summary, unpredictability heightens individuals' overall sensitivity to fairness cues, which makes them more alert to any possible violation of fairness and react more strongly if violation is sensed.

In my study, with the unpredictable point reward scheme, individuals sometimes receive the expected point rewards, while other times they miss out those points. When not receiving the expected point rewards, the effort-reward correspondence is lacking, prompting individuals to feel that fairness is violated. In addition, reward unpredictability intensifies their sensitivity to fairness cues. In situations where they do not attain the point rewards, individuals will notice the violation more quickly and react more strongly to it. Therefore, I predict that individuals will experience less fairness when provided unpredictable point rewards compared with predictable point rewards. Specifically:

> **H2: During a repetitive work process, individuals perceive the point reward scheme as less fair when they are provided with unpredictable point rewards than when they are provided with predictable point rewards of the equivalent amount.**

My first and second hypotheses establish the opposite effects of reward unpredictability where rewards can positively affect perceived task attractiveness but, at the same time, negatively affect perceived fairness towards the point reward scheme. Next, I consider how both the positive and negative effects of reward unpredictability influence individuals' disengagement in a boring, repetitive task. I anticipate perceived task attractiveness to reduce individuals' disengagement. Attractive tasks are more likely to intrinsically motivate individuals, and intrinsic motivation has been found to be a predictor of engagement (Cohen-Charash and Spector 2001; Ryan and Deci

2000b; Delaney and Royal 2017; Walker et al. 2006). Thus, individuals should experience less disengagement with increased task attractiveness. However, multiple behavioral and neuroscience studies have demonstrated that perceived violation of fairness induces negative emotions (e.g., unhappiness) and lead to counterproductive outcomes, such as reduced morale and effort (Cohen-Charash and Spector 2001; Colquitt et al. 2001) and withdrawal from the focal work task to restore fairness (Bol et al. 2015; Cohen-Charash and Spector 2001; Janssen 2001; Tabibnia and Lieberman 2007; Sanfey et al. 2003). Consequently, decreased perceived fairness could be followed by greater disengagement from the focal task.

Taken together, theory suggests that increased task attractiveness perception reduces disengagement while decreased fairness perception of the point reward scheme increases disengagement. Thus, it is unclear whether the overall effect of point reward unpredictability on disengagement will be positive or negative. Hence, I present my first research question as:

RQ1: During a repetitive work process, how will individuals' disengagement be impacted when they are provided with unpredictable point rewards compared with when they are provided with predictable point rewards of the equivalent amount?

3.3 The Effect of Point Reward Unpredictability on Disengagement When Point Rewards Have Cash Value

Next, I investigate whether, and how, the effect of point reward unpredictability on disengagement may change when the point rewards carry cash value. Numerous studies have demonstrated that adding extrinsic rewards such as monetary remuneration can reduce intrinsic motivation when individuals already intrinsically enjoy working on a task (e.g., Bailey and Fessler

2011; Deci 1971; Deci et al. 1999; Gagné and Deci 2005). This is referred to as the motivating crowding-out effect (Frey 1994; Frey and Jegen 2001).

Motivating crowding theory describes the interaction of the intrinsic value of performing a task and the extrinsic value of the outcome given a certain level of performance (Frey and Jegen 2001). When a task has intrinsic value, individuals may perceive the small amount of monetary compensation negatively; for example, as a type of external control of their effort (Fessler 2003; Gagné and Deci 2005; Ryan and Deci 2000a). Subsequently, they will consider the task as less attractive because it does not satisfy their need for autonomy (Deci et al. 1999; Ryan and Deci 2000a). More recent neuroscience studies also find evidence of the motivating crowding-out effect, and that individuals' feeling of a reduced sense of self-determination is the reason behind the crowding-out effect (Di Domenico and Ryan 2017; Ma et al. 2014; Murayama et al. 2010).

When developing H1, I establish that the unpredictability of point rewards increases task attractiveness; thereby adding to the intrinsic value of the task. In other words, individuals' intrinsic motivation to perform the task is boosted due to point reward unpredictability. It is plausible that attaching a small amount of cash value to the point rewards triggers the motivating crowding-out effect and undermines the motivating effect of the increased perceived task attractiveness. Thus, my third hypothesis proposes a moderating effect of attaching cash value to the point rewards:

H3: During a repetitive work process, attaching cash value to point rewards attenuates the positive effect of unpredictable point rewards on perceived task attractiveness, compared with when point rewards have no cash value.

Similarly, in the following hypothesis, I explore the moderating effect of attaching cash value to point rewards on the relationship between point reward unpredictability and perceived fairness of the point reward scheme. Previous research provides insights into the moderating effect in three aspects.

The first aspect pertains to individuals' expectation of extrinsic payoff when intrinsic value of a task is insufficient. There is evidence that when individuals perceive a task as having an inferior intrinsic value, they often expect a superior extrinsic payoff to ensure that the sum of their psychological and financial gains are sufficient to compensate their effort (Murayama et al. 2010; Seymour and McClure 2008). Attaching cash value to point rewards diminishes the intrinsic value of the task, resulting in a high expectation for favorable outcomes from the unpredictable reward scheme.

The second aspect is a shift of individuals' focus from the process to the final outcome of the task. Without cash value attached, point rewards are a component of the task design and only relevant to the task process. In other words, the points bring no repercussions to individuals' life outside the task. When cash value is attached to the point rewards, however, the connection between individuals' effort investment and their final monetary outcome is immediately highlighted. This is because money is instrumental and relevant to real life (Bonner and Sprinkle 2002). Gaining or missing out on the unpredictable point rewards now has consequences, thereby causing a stronger and more direct impact on individuals.

The last aspect speaks to individuals' general fairness perception of performance-contingent pay schemes. In essence, attaching cash value to point rewards changes the compensation from a fixed wage scheme to a performance-contingent scheme. Importantly, the

unpredictable point rewards can be viewed as noisy measures of individuals' performance (Feltham and Xie 1994). Prior literature in economics and accounting suggests that performance-contingent incentives based on noisy performance measures can harm individuals' fairness perception, because employees are concerned about being punished by factors that cannot be perfectly observed or are out of their control (e.g., Bol et al. 2015; Kelly et al. 2015; Isaac 2001). Other studies have also shown that when uncontrollable risk factors negatively impact individuals' performance, they feel a violation of fairness and anticipate some form of ex post adjustment to or redistribution of their gain to restore their sense of fairness (e.g., Bol et al. 2015; Cappelen et al. 2013; Kelly et al. 2015).

Based on the above, it is reasonable to expect that attaching cash value to point rewards can further exacerbate the felt violation of fairness stated in H2. Therefore, I predict that:

H4: During a repetitive work process, attaching cash value to point rewards exacerbates the negative effect of unpredictable point rewards on perceived fairness of point reward scheme, compared with when point rewards have no cash value.

My third and fourth hypotheses predict how attaching cash value to point rewards may moderate the relationship between point reward unpredictability and perceived task attractiveness as well as perceived fairness of the point reward scheme, respectively. Next, I present my second research question on disengagement, which explores the net effect of the moderating effects stated in H3 and H4.

It is not obvious whether disengagement is positively or negatively affected by point reward unpredictability when cash value is attached to the point rewards. On the one hand, attaching cash value thwarts the efficacy of point reward unpredictability by crowding-out the

motivating effect of task attractiveness. As a result, disengagement should be worsened. On the other hand, although both H2 and H4 point to the violation of fairness, it is not without tension. While a sense of violation of fairness harms morale and drives the withdrawal of effort, a strong unfair feeling can in fact activate the brain region associated with intense negative emotions (e.g., pain, distress, and anger) (Murayama et al. 2010; Sanfey et al. 2003; Seymour and McClure 2008). Subsequently, those emotions can arouse individuals and reduce their disengagement.

Since the two moderating effects stated in H3 and H4 may counteract each other, the impact of reward unpredictability on disengagement is unclear. Thus, I propose the following research question similar to RQ1:

> **RQ2: During a repetitive work process, how will individuals' disengagement be impacted when they are provided with unpredictable point rewards with cash value attached, compared with when they are provided with predictable point rewards of the equivalent amount?**

3.4 The Effect of Point Reward Unpredictability on Performance

Motivated by both theoretical and practical reasons, I examine the efficacy of unpredictable point rewards on improving performance. Ample studies have found that incentives do not always improve performance and the efficacy of incentives varies largely depending on their motivational mechanisms (e.g., expectancies, expected utility, goals), individual differences (e.g., skill, personal traits) and contextual factors (e.g., task complexity, work autonomy, reward scheme characteristics) (see reviews by Bonner et al. 2000; Bonner and Sprinkle 2002). Thus, examining the effect of point reward unpredictability on performance has theoretical importance.

Practically speaking, it is beneficial that managers understand the overall effect of unpredictable point rewards on performance, because it helps to inform them of the optimal way to incorporate unpredictable point rewards in their management and control systems. For the above reasons, besides examining the effect of reward unpredictability on individuals' disengagement, I evaluate the total effect of point reward unpredictability on performance.

There are studies showing that disengagement is negatively associated with performance (e.g., Dorrian et al. 2007; Pattyn et al. 2008; Wrosch et al. 2003) because disengaged individuals experience a withdrawal of the supervisory attention system, making them react slower and make more mistakes. However, as established in RQ1 and RQ2, it is uncertain how disengagement will vary when point rewards are unpredictable (vs. predictable). Accordingly, the total effect of reward unpredictability on performance is not clear. My two research questions, one for the setting when cash value is not attached to point rewards and the other for the setting when cash value is attached to point rewards, are put forward as:

RQ3: During a repetitive work process, how will individuals' performance be impacted when they are provided with unpredictable point rewards with no cash value compared with when they are provided with predictable point rewards of the equivalent amount?

RQ4: During a repetitive work process, how will individuals' performance be impacted when they are provided with unpredictable rewards with cash value attached, compared with when they are provided with predictable point rewards of the equivalent amount?

3.5 Summary

In this chapter, I develop four hypotheses and four research questions regarding the effect of reward unpredictability on individuals' disengagement and performance in settings where the rewards either carry (H3, H4, RQ2, and RQ4) or does not (H1, H2, RQ1, and RQ3) carry monetary value. Table 1 contains a list of the hypotheses and research questions, their expected signs, and the according findings. Discussion of the findings is included in Section 5.5. In the upcoming chapter, I describe the details of the research method that is used to test the hypotheses and provide evidence to answer the research questions.

CHAPTER 4: METHODOLOGY

4.1 Introduction

I adopt a 2 x 2 between-subject design to test my hypotheses. The manipulated independent variables include the level of unpredictability of point rewards (*Point Reward Unpredictability*) and whether the points carry cash value (*Cash Value of Point Reward).* The summary of experimental conditions is presented in Figure 1.

The rest of the chapter is organized as follows. Section 4.2 provides an overview of the experimental design and procedures. Section 4.3 describes the independent variables, which are my manipulation. Section 4.4 introduces the dependent variables, which include 1) perceived task attractiveness, 2) perceived fairness of point reward scheme, 3) disengagement, and 4) performance. Section 4.5 discusses the control and other measured variables. Section 4.6 provides a summary of this chapter.

4.2 Experiment Details

4.2.1 Participants and Tasks

In total, 198 students from a participant pool at Wilfrid Laurier University participated in my study.[2] They are recruited through the university's research participation system. This system is developed to provide the experience of being a research participant to Wilfrid Laurier students and allow sound and reliable data collection for researchers. Students who are interested in being a member in the participant pool must request a new account every year. After their account is

[2] More participants' demographic information can be found in Section 5.2.

assigned, students can voluntarily register to participate in research studies posted on the system's bulletin page and receive course credits, gift cards and/or cash compensation for their participation.

In my study, participants' first task is to complete a 10-minute online survey before attending the experimental session on Zoom.[3] The online survey contains measures of control variables, demographic, educational and work information, and gaming experience. Participants complete this part of the study one week prior to the experiment session. In the experiment session, participants' main task is to perform a decoding task (Chow 1983) for two periods of 20-minutes each. In this task, participants decode a three-digit number into a letter of the alphabet using a decoding key, which is provided right above the answer box.[4]

The decoding task is suitable for my study for three reasons. First, the task is repetitive[5] and monotonic[6]. Second, the searching nature of the task requires sustained attention. As discussed in Section 2.2.1, boredom induces a withdrawal of the supervisory attention system and drives shirking. Therefore, I expect performance variation in this task to reflect changes in the level of boredom and disengagement individuals experience while performing the task. Third, this task is reliable. Its effects have been validated in many studies (see Choi et al. 2018).

[3] The original design of the study was a laboratory experiment. Due to COVID-19, indoor gathering was prohibited. Alternatively, I used Zoom video meetings to gather participants online to complete the experiment at the same time. To simulate the laboratory environment, participants were encouraged to leave their camera on throughout the meeting. However, if they felt uncomfortable to do so, they had the freedom to turn their camera off. This modification of design was approved by the Research Ethics Board at Wilfrid Laurier University.

[4] See Appendix 9 for an example of the decoding questions.

[5] On average, participants spend about 7 seconds on each question, which means that the required work action is repeated every 7 seconds (see Table 4).

[6] Each question fits in one screen. The format is very simple, and it is consistent across all questions.

In the task, participants must answer a decoding question correctly to advance to the next.[7] That is, participants cannot skip a question or submit an incorrect answer and continue. Thus, in this decoding task, participants must complete all decoding questions correctly. With this design in place, it is to participants' disadvantage to rush through the task, because they need to redo the question if their answer is incorrect. The optimal strategy is thus to answer each question correctly in their first attempt, rather than attempting as many questions as possible.[8]

4.2.2 Compensation

In this study, participants are compensated in several ways. For the survey, participants receive $2 for participation and $1 extra if they complete 100% of the survey. For the Zoom session, participants' compensation has two components, baseline compensation and point rewards. For the baseline compensation, participants receive $7 plus 1.25 course credit for completing 100% of the one-hour Zoom session, and $2 if they withdraw from the study after starting the session. As to point rewards, participants receive them as they perform the decoding task. Depending on participants' condition, those point rewards may or may not be converted to cash at the end of the experiment (for details see Section 4.3). The conversion rate is 1 point = 0.005 Canadian Dollars. Participants are paid in private through online monetary transfer.

By design, the cash value is nominal. In my study, I examine a setting where the main source of utility is the entertainment value (e.g., fun and excitement) of unpredictable game

[7] In both the practice and the formal performance periods, after every incorrect answer submitted, participants will see the background of the question and the answer textbox turns from white to light blue (the default way invalid responses are highlighted in Qualtrics) and a pop-up message of "Incorrect answer" in red. The highlight and pop-up message will disappear, and the next question will only appear after the correct answer for the current question is submitted.

[8] My task is not designed to allow participants to test different strategies (e.g., prioritizing accuracy versus prioritizing quantity). This is different from tasks used in experiments that are designed to test participants' effort allocation among multiple dimensions of effort (e.g., Christ et al. 2012; Christ et al. 2016).

rewards. On that basis, the monetary value of the rewards is minimized to avoid the noise from individual financial risk concerns. Further, this design choice is practically meaningful. In the workplace, the dollar value of earned points is much less than the main component of compensation (e.g., base salary). For example, in finance, technology and manufacturing sectors, companies reward employees with average performance $107 to $120 and top performers $352 to $451 in points, gift cards and merchandise annually (Incentive Research Foundation 2019a, 2019b, 2019c).[9]

4.2.3 Experimental Procedures

Figure 2 summarizes the experimental procedure. Both the online survey and Zoom session are programmed using Qualtrics. After receiving approval from the Research Ethics Board of Wilfrid Laurier University[10], I post the study in the university's research participation system to recruit participants. My posting has a Qualtrics link to the online survey. Participants must follow the link and complete the survey within two days of registration.

The survey starts with a consent letter, which includes information about cash and course credit compensation for both the survey and the Zoom session. After giving consent, participants first respond to a series of scales with Likert-point items that measure personal traits, including boredom proneness (Struk et al. 2017), financial, gambling and recreational risk attitudes (Dohmen

[9] The size of cash gain is not necessarily a decisive factor to individuals' interest of participating in an activity, especially in a game setting where entertainment value of the activity is inherent. For example, the net expected gain of Lotto play is typically negative. In the study by Kelly et al. (2021), to win each dollar on the slot machine, employees on average need to complete more than 7 daily training modules. Another example that individuals willingly engage in an effortful activity when cash reward is small is the 15-day 400-meter lap running experiment in Shen et al. (2019). In their study, participants are compensated 5 HKD (0.8 CAD) versus 3 or 5 HKD (0.6 or 0.8 CAD) for each lap they run, and on average, participants run 7.5 laps versus 14 laps in the two conditions.

[10] In the university's research ethics board, this study's file number is REB# 6170. Please see Appendix 11 for the informed consent statements used in the study.

et al. 2011; Weber et al. 2002), uncertainty avoidance (Jung and Kellaris 2004), and dispositional optimism (Scheier and Carver 1985).[11] Next, participants answer a few questions about their basic demographic, educational and work information, such as gender, age, major, academic program, academic year, work experience and grade point average (GPA).[12] Finally, they report the amount of time they spend playing video, computer or mobile games in a typical week.

One week later, participants join their designated Zoom session via a meeting invitation sent to their email in advance to complete the experiment.[13] In each session, the experiment administrator briefly greets the participants and confirms that they understand how to use the hand raise and chat functions on Zoom to ask questions or report technical errors of the program, if any. Then participants receive a link to the experiment instrument, a Qualtrics program, in the chat window and start working on the program by clicking on the link. Participants remain in the Zoom meeting until they finish the experiment.

They first read the consent letter for the participating in the Zoom session. Upon giving consent, they are randomly assigned to one of the four conditions and presented with instructions about the decoding task. Next, they read information about how the points are awarded and the type of performance feedback they can expect to receive, which includes cumulative sums of decoding questions completed and point rewards earned, respectively. Subsequently, participants read details about their compensation, including both the baseline compensation and point rewards. For those who are assigned to the conditions where point rewards carry cash value, they also read about how points can be converted to cash at the end of the experiment.

[11] See Section 4.5 for details of these variables.
[12] See Appendix 7 for specific questions.
[13] Among the participants who completed the survey, about 96% attended their Zoom sessions.

Following the above reading, participants enter a practice period. I consider participants' performance in the practice period as a baseline and use it to proxy for their ability, which is a control variable included in my formal analyses. Since my manipulation of point reward unpredictability is embedded in the practice period, this measure is different from the ability measure in some studies, where the ability measure is based on participants' performance in a task without the impact from manipulation. I believe the current setup is necessary considering my overall research design. By incorporating my manipulation in the practice period, I can obtain more accurate measurement of an important dependent variable, perceived task attractiveness, without sensitizing participants. Although this setup can potentially add noise to the measurement of participants' true ability, the influence is likely minimal. This is because, on average, participants are only exposed to one occurrence of the manipulation.[14] Also, they are not compensated for the practice period, so the level of noise is limited.[15]

To ensure that participants' performance in the practice period reflects their baseline performance in the task, the practice period is structured in the same way as the performing periods: participants complete a series of decoding questions. They can check their cumulative sum of points gained after every 10 questions. For those who receive predictable point rewards, they are told they will earn 5 points for completing 10 questions in the performance period. For those who receive unpredictable point rewards, the message is the same, except that the number of points gained will be either 10 or 0.[16] Similar to the first condition, they receive performance feedback

[14] My manipulation of point reward unpredictability occurs after every 10 decoding questions. On average, participants complete 18 decoding questions in the practice period (see Table 4).

[15] In addition, participants' performance in the practice period (the *Ability* variable) is not significantly different between conditions. See Section 5.2 for details.

[16] I use a relatively small point scale because during the 40 minutes performance, participants on average have 30 opportunities to receive point rewards and gain 150 points in total. A large point scale (e.g., 1000, 500 and 0 points)

about the cumulative sum of questions completed. Throughout the practice period, participants are able to track their time using a count-down timer that is displayed on the top center of their screen. To minimize the noise from participants' varying reading speed, I control the time participants spend on the feedback page. Specifically, each feedback page is programmed to display for 8 seconds, after which participants automatically advance to the next page.

After the practice period, participants evaluate the attractiveness of the task.[17,18] Next, they answer a few questions to demonstrate their comprehension of the experiment.[19] Participants must answer all questions correctly to proceed to the performing periods. Each performing period is 20 minutes long. There is no break but there is one performance feedback message between the two periods. This performance feedback has the same structure as the other feedback participants receive after completing 10 decoding questions, except that it is titled "Halftime Performance Summary" and includes the cumulative sum of questions completed and points gained. Similar as in the practice period, participants see a count-down timer on their screen throughout the task for time tracking.

Subsequent to the performing periods, participants answer a post experiment questionnaire, which includes measurement of their disengagement (adapted from Fahlman et al. 2013), positive

means that most of participants' earnings feedback will be in 4 or 5 digits, which may unnecessarily cognitively overload participants and make the communication of earnings cumbersome.

[17] I acknowledge that individuals' perceived task attractiveness may be different if it were measured at a later point of the experiment. However, to ensure the exclusion of other factors that can potentially spillover and bias the measure (e.g., fatigue), I decide to measure it immediately after the practice period. This time spot is also consistent with previous research that measure individuals' perception of task attractiveness (e.g., Fessler 2003). In addition, my manipulations are quite straightforward. I expect their presence in the practice period to be sufficient to cause significantly different perceptions between the fixed and loot point rewards conditions.

[18] For details about the measure of task attractiveness, see Section 4.4.1.

[19] The questions ask participants' understanding of the point reward scheme (and cash, for those in the conditions where point rewards have cash value), the length of the performing periods and the time available for reviewing each feedback.

and negative affects (adapted from Watson et al. 1988), perceived fairness of the point reward scheme (adapted from Hannan et al. 2005) [for those who are in the conditions where points can be converted to cash, perceived fairness of the cash scheme (Hannan et al. 2005)], perceived playfulness of the decoding component, the perceived playfulness of the point rewards component and the overall task, the level of curiosity about the number of points earned and the level of motivation to decode.[20] After answering those questions, participants read a summary report of their total performance and compensation.[21] They then fill out a form for receiving payment via online transfer and exit the Zoom meeting.

4.3 Independent Variables

There are two independent variables in this study. The first independent variable is the between-subjects manipulation of the unpredictability of point rewards. Point rewards are given after every 10 decoding questions participants have completed. In the *Point Reward Unpredictability (Fixed)* conditions, participants click the check button and then read that they have earned 5 points for completing 10 questions. In the *Point Reward Unpredictability (Loot)* conditions, participants click the check button next to a closed loot chest picture. They then see an opened chest that is either empty or loaded with gold coins, accompanied by a pirate captain in tears or laughter, respectively. In the case of an empty chest, participants read that they did not gain any loot points. In the case of a loaded chest, they read that they have won 10 points of loot.[22] The probability of seeing each loaded chest is 50%, which is known to participants as they read it

[20] For details of the variables, see Section 4.5.

[21] In all conditions, a reward opportunity is provided only when participants complete a set of 10 decoding questions. For example, if a participant's total performance is 302, s/he has 30 opportunities to receive point rewards, instead of 31.

[22] See Appendix 8 for details of the pages.

in the instructions before starting the practice period. This design choice is based on previous findings suggesting that dopamine neurons are most active when reward probability is 50% (Linnet 2014; Preuschoff et al. 2006; Schultz 2007). The sequence of loot point rewards is randomly generated before the experiment and applied to all participants in the *Point Reward Unpredictability (Loot)* conditions.[23]

The second independent, between-subject variable is my manipulation of whether point rewards carry cash value. In the *Cash Value of Point Reward (Absent*) conditions, cash conversion is not available for the points gained. By contrast, in the *Cash Value of Point Reward (Present)* conditions, participants receive 0.05 Canadian dollars for every 10 points earned. The conversion from points to cash happens after participants have completed the post experiment questionnaire. On average, each participant gains 0.74 Canadian dollars from the points for their 40 minutes decoding work. Based on the practical application of point rewards, to reduce the likelihood that participants perceive the cash income from point rewards as similar with their baseline compensation, the cash value of point rewards is kept small relative to the baseline compensation.

4.4 Dependent Variables

I measure four primary and two supplementary dependent variables to test my hypotheses. The primary dependent variables are: 1) perceived task attractiveness, 2) perceived fairness of point reward scheme, 3) disengagement and 4) total performance. Performance in periods 1 and 2 are the two supplementary dependent variables. Their measurement is explained below in more detail.

[23] The sequence of loot point rewards is as follows. Period 1: 10, 10, 10, 0, 10, 0, 0, 0, 0, 10, 0, 10, 0, 0, 10, 0, 10, 10, 0, 10, 10, 0, 10, 0, 0 and 10. Period 2: 10, 0, 0, 10, 10, 0, 10, 0, 10, 0, 10, 0, 0, 10, 0, 10, 10, 10, 0, 0, 10, 0, 10, 10, 0 and 0.

4.4.1 Task Attractiveness

To measure participants' perception of task attractiveness (*Task Attractiveness*), I use an adapted three-item, 11-point Likert scale based on the work of Fessler (2003). The scale is created by Scott Jr and Erskine (1980). A number of studies have used the scale to measure individuals' task attractiveness perception (e.g., Bailey and Fessler 2011; Webb et al. 2013). To ensure that the questions are relevant to my experimental context of gamification and avoid overlapping with other measures in the post experiment questionnaire, I use three out of seven questions from the scale used in Fessler's (2003) study as my measurement of *Task Attractiveness*.[24] Participants report, after completing the practice period, whether they think the task (or game, if they are in the loot point rewards conditions) is attractive or repulsive (1: "extremely attractive", 11: "extremely repulsive"), exciting or dull (1: "extremely exciting", 11: "extremely dull"), and fun or tedious (1: "extremely fun", 11: "extremely tedious"). The average score of those items is used to test H1, H3, RQ1 and RQ2. To validate the 3-item measure, I conduct an exploratory factor analysis (EFA) with principal component extraction. As shown in Table 2, the three-item scale has a one-factor structure. The factor, whose eigenvalue is 2.45, explains 81.54% of the total variance. Overall, the scale has good reliability (Cronbach's $\alpha = 0.88$).

4.4.2 Fairness of Point Scheme

To measure participants' perception of the level of fairness of the point reward scheme (*Fairness of Point Scheme*), I follow Hannan et al. (2005) and ask participants to rate, after they have completed the 40 minutes of decoding period, to what extent they agree with this statement:

[24] Among the four questions I do not include in my study, one asks about whether the task is interesting or boring, which overlaps with the positive and negative affect. The other three questions ask whether the task is good or bad, superior or inferior, and wholesome or unwholesome. Those questions are less relevant in my setting and are vague in nature.

"I think the point reward scheme is fair." (1= "strongly disagree" and 11= "strongly agree"). The original question in Hannan's work asks participants to rate the fairness of a cash compensation scheme. I revise the question to focus on point reward scheme so that it is appropriate to the setting of my study. The score of the item is used to test H2, H4, RQ1 and RQ2.

4.4.3 Disengagement

The third dependent variable is participants' disengagement (*Disengagement*). I use a three-item, 11-point Likert scale adapted from Fahlman et al. (2013) to measure *Disengagement* (1= "strongly disagree" and 11= "strongly agree"). This scale is suitable for the repetitive work setting of my study because it measures spontaneous disengagement that arises from state boredom. As the first full-scale measure of state boredom (Hunter et al. 2016), Fahlman et al. (2013)'s scale is widely used in the psychology literature and validated in various languages as a consistent and reliable measure (e.g., Alda et al. 2015; Craparo et al. 2017). The original disengagement scale has 10 items. To make sure that the measure is concise and the questions are relevant to my experiment setting,[25] I use three questions from the full scale: 1) "I seemed to be forced to do things that had no value to me"; 2) "I wanted to do something fun, but nothing appealed to me"; and 3) "I wish I were doing something more exciting" To validate the three-item measure, I conduct an EFA with principal component extraction. The results show that *Disengagement* has a one-factor structure and all items in the scale have loadings greater than 0.50. Only one factor yields an eigenvalue greater than 1 and it explains 74.73% of the total variance. The scale has good reliability

[25] Some of those 10 items in the original scale overlap. For example, "I feel like I'm sitting around waiting for something to happen." and "I want something to happen but I'm not sure what." Other items are not relevant in my setting. For instance, "I am indecisive or unsure of what to do next." is not suitable because participants in my study clearly know what to do.

(Cronbach's α = 0.83). Details of those items and the EFA results can be found in Table 2. The average score of the items is used to test RQ1 and RQ2.[26]

4.4.4 Performance

I define performance as the number of decoding questions participants complete. To test whether performance is sensitive to time, I measure participants' performance in two consecutive periods. *Performance (Period 1)* and *Performance (Period 2)* are the total number of decodes completed in the first and the second 20-minute decoding period, respectively. *Performance (Total)* is the sum of *Performance (Period 1)* and *Performance (Period 2)*. Since I control for individuals' ability in the decoding task[27], their performance is a good proxy for effort. *Performance (Total)* is used to test RQ3 and RQ4. *Performance (Period 1)* and *Performance (Period 2)* are used as supplementary dependent variables to further validate the findings on *Performance (Total)*.

4.5 Control and Other Measured Variables

4.5.1 Ability

Following prior studies (e.g., Libby 1999; Fisher et al. 2002b), I control for the potential influence of participants' innate ability in answering the decoding questions by including *Ability* as a covariate in all the main analyses. *Ability* is measured by the number of decoding questions

[26] To validate *Disengagement*, I measure participants' inattention and perception of time using scales adapted from Fahlman et al. (2013). I find that both measures are strongly associated with *Disengagement* (N=198, $\rho_{Disnegagement,Inattention} = 0.60, p < 0.01$, two-tailed; $\rho_{Disnegagement,Time\ Perception} = 0.64, p < 0.01$, two-tailed). Interestingly, one-way analyses of variance (ANOVAs) results of the cash value absent conditions (N=98) show that point reward unpredictability do not significantly affect participants' inattention (F = 0.16, p = 0.69) or perception of time (F = 1.60, p = 0.21). A plausible explanation is that the decoding task is interactive and thus always requires participants' attention, and the performance periods are timed, allowing little room for mind wandering. Therefore, although participants can become disengaged as captured by the *Disengagement* scale, they may not feel differences in their attention and perception of time flow.

[27] For details see Section 4.5.1.

participants complete in the 2-minute practice period. On average, participants finished about 18 questions in the practice period.

4.5.2 Boredom Proneness

I measure boredom proneness and all other individual difference variables (discussed below in Sections 4.5.3-4.5.6) in the survey of the study about one week prior to the experimental session. The interval between the survey and the Zoom session prevents any "spillover" of these questions.

The magnitude of boredom individuals may experience while performing a specific task can vary. The difference lies in the trait of boredom proneness (Vodanovich et al. 2005). Boredom proneness refers to the individual differences in the likelihood of becoming bored in a given situation (Culp 2006). To control for the effect of this individual trait on performance in the decoding task, I use the unidimensional boredom proneness scale by Struk et al. (2017). The scale is a short version of the original boredom proneness scale developed by Vodanovich et al. (2005). The scale includes eight items. Participants answer the questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). Examples of the questions include: "Many things I have to do are repetitive and monotonous." and "In most situations, it is hard for me to find something to do or see to keep me interested.". The detailed scale can be found in Appendix 1.

4.5.3 Risk attitudes

It is reasonable to suspect that the effect of point reward unpredictability on performance varies according to individual differences in risk attitude. To control for this potentially confounding effect, I measure participants' risk attitude in three domains that are relevant to the design of this study, namely financial, recreational, and gambling risk attitudes. For financial risk

attitude, I follow Dohmen et al. (2011) and ask participants to decide whether they prefer an option of a fixed amount of monetary gain (from $10 to $200, at $10 intervals) or a lottery with 50% probability of winning either $300 or $0.[28] The expected value of the lottery is $150, which means that a risk-neutral participant should feel indifferent between that lottery option and a safe gain option of $150. Participants are considered risk-averse if they prefer a safe gain option of less than $150 over the lottery option, and risk-seeking if they prefer the lottery option when the safe gain option is more than $150. The extent to which participants are risk-averse or risk-seeking is determined by the point of indifference between the two options.

Weber and her colleagues (2002) propose a domain-specific risk attitude scale that measure individuals' tolerance to uncertainty in various settings, including financial, health/safety, recreational, ethical and social decision making. Particularly, within the financial decision making context, the authors consider gambling as a domain that is separated from financial investing. Given that my manipulation of loot point rewards shares some common features with lotteries and that gamification is expected to make the task more fun, I include the gambling and recreational subscales in this study. The gambling risk attitude measure consists of four 11-point Likert scale questions (1="very unlikely"; 11="very likely"), each of which asks the likelihood of the individual to engage in a certain betting action. The recreational risk attitude measure has eight 11-point Likert scale questions (1="very unlikely"; 11="very likely"). They question the likelihood of doing

[28] In this study, I use a well-accepted measure of financial risk attitudes. However, its suitability in my setting may be limited, because the scale items ask about hypothetical scenarios, which means that participants imagine their preferences in each risk situation instead of playing the lotteries for real and earn (or miss) the monetary outcomes. Also, the expected cash value of the options is larger than that employed in the experiment. Some studies (Holt and Laury 2002, 2005) find a significant increase in individuals' risk aversion when the payoff of a lottery increases largely, e.g., from $4 to $200 and such increase is not observed when the payoffs are hypothetical. One other difference in my application of this scale is that the safe options started from $10 in this study, instead of $0.

something dangerous but fun (i.e., bungee jumping). Details of the risk attitude scales are provided in Appendix 2.

4.5.4 Uncertainty Avoidance

Another factor that could influence the effect of loot points on performance is individuals' preference to avoid uncertainty. Uncertainty avoidance at the individual level is conceptualized as the extent to which one tries to avoid uncertainty as much as possible (Jung 2002; Jung and Kellaris 2004). The scale is developed by Jung (2002), which is a modification of the uncertainty avoidance value scale by Hofstede (1984). Jung and his colleagues have validated and refined the scale (2002; 2004). To date, studies in multiple disciplines have used this scale to measure individual level uncertainty avoidance (e.g., Adair and Xiong 2018; Giebels et al. 2017; Seo et al. 2018) It is also been adapted for use in languages other than English (e.g., Altuncu et al. 2012). Following those studies, I measure uncertainty avoidance using Jung (2002)'s scale. Apart from one filler item, it has seven 11-point Likert scale questions (1="strongly disagree"; 11="strongly agree"). See Appendix 3 for details of the scale.

4.5.5 Dispositional Optimism

Participants may be more motivated by loot point rewards if they are inherently more optimistic about the outcome of uncertainty. Thus, I include the dispositional optimism scale proposed by Scheier and Carver (1985) to measure and control for this individual trait. The scale contains twelve 11-point Likert scale questions (1="strongly disagree"; 11="strongly agree"), out of which four are filler questions. The items are presented in Appendix 4.

4.5.6 Other Measured Variables

Apart from the above individual trait variables, in the online survey, I record participants' basic demographic and educational information, including their gender, age, GPA, major, academic year and program. I also ask participants how many months they have worked and, to take participants' gameplay experience into consideration, how many hours per week they spend on gaming on common electronic device (e.g., computer and mobile phone).

In the Zoom session of the study, a few variables are measured in the post-experiment questionnaire. For all these measures, participants answer using a 11-point Likert scale (1="strongly disagree"; 11="strongly agree"). I collect the following information to better understand participants' perception of the task and their emotions at the end of the experiment. I measure participants perceived playfulness of 1) the decoding work, 2) the point rewards, and 3) the entire performance experience. In addition, participants answer a 6-item scale about their positive and negative affects, which is shortened from the original scale by Watson et al. (1988) based on relevancy. I measure the extent to which participants are nervous, irritable, upset, interested, determined, and excited. Appendix 5 provides details of the items. Furthermore, participants report how curious they are about the number of points gained and their overall motivation to decode.

For participants in conditions where the point rewards can be converted to cash, their perceived fairness of the cash reward scheme is measured so that their fairness perception of the point reward scheme is not confounded by the cash income. Specifically, I follow (Hannan et al. 2005) and ask participants to rate this statement: "I think the point reward scheme is fair."

4.6 Summary

This chapter explains my experimental design for hypothesis testing. I adopt a 2 x 2 between-subject design to examine whether point reward unpredictability is effective in harnessing boredom, mitigating disengagement, and thereby improving performance. Participants' compensation structure includes both the baseline component, which is a combination of cash and course credit, and the additional point rewards, which may or may not be converted to cash depending on participants' experimental condition. Also, I describe in detail my participant pool and experimental procedures, as well as my independent, dependent and control variables. In the upcoming chapter, I discuss my findings.

CHAPTER 5: RESULTS

5.1 Introduction

In this chapter, I report the results of testing my hypotheses and investigating my research questions. First, I describe my randomization testing in Section 5.2 and comprehension check results in Section 5.3. Next, I provide descriptive statistics for my main variables in Section 5.4 and discussion about findings on my hypothesis testing and research questions in Section 5.5. In addition, I present results for my supplemental analyses in Section 5.6 and robustness checks in Section 5.7. Finally, I summarize this chapter in Section 5.8.

5.2 Randomization

Among the 198 participants[29] (Table 3), 107 identify themselves as female, 90 as male and one as other. On average, participants are 20 years old, spend 9.6 hours on gaming per week and have 18 months of work experience.

The effectiveness of random assignment in my study is generally reasonable. An untabulated one-way Analysis of Variance (ANOVA) indicates no significant difference in participants' *Ability* across all conditions ($p = 0.23$, two-tailed)[30]. Further, three measured variables, *Financial Risk Attitude* ($p = 0.06$, two-tailed), *Age* ($p = 0.01$, two-tailed) and *Work Experience* ($p < 0.01$, two-tailed) are significantly different across the four conditions. Including those three variables in the main analyses does not alter my statistical inferences[31]. Hence, for hypothesis

[29] There were 187 undergraduate and 11 graduate students.

[30] Hypothesis testing results hold when *Ability* is excluded from the analyses. For detailed discussion on results without *Ability* as covariate, see Section 5.7.

[31] For detailed discussion, please see Section 5.7.

testing and research question exploration, I report results with those variables excluded from the analyses. More detailed discussion about their specific *p*-values can be found in Section 5.7.

5.3 Comprehension Check and Manipulation Check

To ensure that participants understand the key features of the decoding task, I ask participants to take a quiz before they start their first performance period. In the quiz, participants answer the following four questions: 1) "How many points will I receive for completing 10 decodes?", 2) "I will complete as many decoding questions as possible in two _____ minutes periods in a row.", 3) "After each 10 decodes I will receive the performance feedback. How much time do I have to review it?", and, for participants in the *Cash Value of Point Reward (Present)* conditions, 4) "I receive $____ for every 10 points earned.".[32] For each question, there is a "Hint" button. Participants can click the button and review the instructions they read previously that is relevant to the question. They must answer all questions correctly to proceed to the first performing period.

To evaluate the effectiveness of my manipulation of attaching cash value to point rewards, I compare the mean performance of subsamples in *Cash Value of Point Reward (Absent)* and *Cash Value of Point Reward (Present)* conditions, respectively. Results (untabulated) of a t-test (p=0.05) and a Mann Whitney U test (p=0.08) indicate that my manipulation is moderately effective.

5.4 Descriptive Statistics

Table 4 provides descriptive statistics for three performance variables, *Task Attractiveness*, *Fairness of Point Scheme*, *Disengagement* and *Ability* by condition. During the first performance

[32] See Appendix 6 for details of the questions.

period, when cash value is not attached to the point rewards, individuals on average perform similarly when they are given fixed point rewards (*Mean* = 147.73; *SD* = 19.34) or loot point rewards (*Mean* = 148.77; *SD* =19.36). In contrast, when point rewards carry cash value, individuals that receive loot point rewards deliver higher average performance (*Mean* = 160.03; *SD* = 19.33) than those that receive fixed point rewards (*Mean* = 150.02; *SD* = 19.31).

In the second performance period, when the cash value of point rewards is absent, individuals who gain fixed point rewards have slightly greater performance (*Mean* = 150.45; *SD* = 22.43) than those who gain loot point rewards (*Mean* = 145.46; *SD* = 22.45). When the points carry cash value, individuals who receive loot point rewards perform better (*Mean* = 159.41; *SD* = 22.41) than their peers who receive fixed point rewards (*Mean* = 149.04; *SD* = 22.39).

Performance (Total) is the sum of *Performance (Period 1)* and *Performance (Period 2)*. As a result, the abovementioned trend is also observed in *Performance (Total).* Specifically, without cash value on points, the average performance of individuals in the fixed point rewards condition (*Mean* = 298.18; *SD* = 40.15) is slightly higher than that in the loot point rewards condition (*Mean* = 294.24; *SD* = 40.18). With cash value on points, the average performance of individuals in the fixed and the loot point rewards conditions are 319.44 (*SD* = 40.11) and 299.06 (*SD* = 40.07), respectively.

Accordingly, when cash value of points is absent, the average points earned by individuals in the fixed point rewards condition (*Mean* = 147.45; *SD* = 26.37) is higher than in the loot point rewards condition (*Mean* = 135.69; *SD* = 24.92). When cash value is present, individuals on average earn more points when they are in the loot point rewards condition (*Mean* = 154.08; *SD* = 26.05) than in the fixed point rewards condition (*Mean* = 144.02; *SD* = 24.52).

In terms of *Task Attractiveness*, without cash value attached to the points, individuals who are given loot point rewards (*Mean* = 7.39; *SD* = 2.36) perceive the task as more attractive than those who are given fixed point rewards (*Mean* = 6.47; *SD* = 2.47). However, the trend is reversed when cash value is attached to the points. That is, individuals who receive fixed point rewards (*Mean* = 6.84; *SD* = 2.40) give higher rating on the attractiveness of decoding than those who receive loot point rewards (*Mean* = 6.63; *SD* = 2.44).

With respect to *Fairness of Point Scheme*, when cash value is absent, I observe that the value of perceived fairness of point reward scheme is lower for individuals who are rewarded with loot points (*Mean* = 6.14; *SD* = 2.77) than those who are rewarded with fixed points (*Mean* = 7.57; *SD* = 1.92). Similarly, when cash value is present, the level of perceived fairness remains to be lower for individuals who are in the loot point rewards condition (*Mean* = 6.98; *SD* = 2.72) than those who are in the fixed point rewards condition (*Mean* = 7.43; *SD* = 2.67).

Regarding *Disengagement*, without cash value attached to the point rewards, individuals who gain loot point rewards (*Mean* = 7.13; *SD* = 2.13) experience a lower level of disengagement than those who gain fixed point rewards (*Mean* = 7.65; *SD* = 2.27). An opposite relationship is observed when cash value is attached. Specifically, individuals who receive fixed point rewards (*Mean* = 7.02; *SD* = 2.07) experience a lower level of disengagement than those who received loot point rewards (*Mean* = 7.31; *SD* = 1.89).

5.5 Hypotheses Testing and Research Question Investigation

Recall that my first two hypotheses (H1 and H2) test the independent effect of loot point rewards. Hence, findings for those predictions are discussed in the context when cash value of

point reward is absent. My third and fourth hypotheses (H3 and H4) tap into the moderating effect of cash on loot point rewards. Thus, I consider all conditions when examining those hypotheses.

I conduct ANOVA, repeated-measure Analysis of Covariance (ANCOVA), and multiple group path analysis[33] to test my hypotheses and investigate my research questions. The ANOVA results[34] on *Task Attractiveness*, *Fairness of Point Scheme* and *Disengagement* are reported in Table 5-7 and graphically presented in Figure 3-5. Table 8 and Figure 6 show the repeated-measure ANCOVA results on *Performance*, where performance period is the within-subject independent variable and *Ability* is the covariate.

The path analysis results are shown in Figure 8 and Table 10. The theoretical (or partially constrained) path model is specified so that all structural paths are allowed to vary between the *Cash Value of Point Reward (Absent)* and *Cash Value of Point Reward (Present)* groups. The fit indices indicate that the theoretical path model has a good fit of the data (χ^2 (16) = 20.87, p = 0.19; CFI = 0.97; TLI = 0.95; RMSEA = 0.04; Standardized RMR = 0.07).

5.5.1 Test of Hypotheses 1 and 3

I conduct an ANOVA to test the effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on *Task Attractiveness*. Results in Table 5 indicate a marginally significant interaction effect (Panel A, F = 2.72, p = 0.10, two-tailed). Therefore, I find partial support for H3,

[33] I compare the theoretical (unconstrained) path model against a fully constrained model and the results suggest the superiority of the theoretical model. As shown in Table 10, Panel A, the Chi-square difference test indicates that these two models are not significantly different from each other ($\Delta \chi 2$ (7) = 11.41, p = 0.12). However, all fit indices of the fully constrained model are worse than those of the theorized model.

[34] *Ability* is not controlled in these ANOVAs, because I do not expect participants' perceptions of task attractiveness and fairness of the point reward scheme to be dependent on their ability. In addition, no relative performance information is provided to participants, so they are not able to gauge their own ability in relation to that of their peers when developing those perceptions. Regardless, I run the ANOVAs that include *Ability* is as a control variable. Results suggest no inferential differences.

which states that during a repetitive work process, attaching cash value to point rewards attenuates the positive effect of loot points on perceived task attractiveness, compared with when points have no cash value. Figure 3 presents the above results in line graphs.

I conduct a planned contrast analysis following the above ANOVA to examine H1. H1 predicts that during a repetitive work process, individuals perceive the task as more attractive when they are rewarded with loot point rewards than when they are rewarded with fixed point rewards of the equivalent amount. Result in Panel B, Table 5 shows a moderately significant effect of loot point rewards on *Task Attractiveness* (F = 3.53, p = 0.06, two-tailed). Such effect is further corroborated by the path analysis results (Table 10). When cash value of point rewards is absent, the path from *Point Reward Unpredictability* to *Task Attractiveness* is positive at moderate significance (β = 0.19, *SE* = 0.49, p = 0.06, two-tailed). In summary, my findings support H1.

As a follow-up examination of H3, I look at the results for the *Cash Value of Point Reward (Present)* group in the path analysis (Table 10). The path from *Reward Unpredictability* to *Task Attractiveness* is not significant (β = -0.05, *SE* = 0.48, p = 0.65, two-tailed). I calculate the *z*-statistics to compare the coefficients of the path from *Point Reward Unpredictability* to *Task Attractiveness* between the two *Cash Value of Point Reward* conditions and find a significant difference (z = -1.66, p = 0.05, two-tailed, untabulated). To sum up, given that the interaction effect in the ANOVA is marginally significant and that the difference between those path coefficients is significant, I find partial support for H3.

5.5.2 Test of Hypotheses 2 and 4

H2 and H4 are tested in a similar fashion as H1 and H3. I run an ANOVA to examine the effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on *Fairness of Point*

Scheme. According to the results in Table 6, no significant interaction is observed between *Point Reward Unpredictability* and *Fairness of Point Scheme* (Panel A, F = 1.84, $p = 0.18$, two-tailed). Hence, H4 is not supported. In other words, during a repetitive work process, attaching cash value to point rewards do not exacerbate the negative effect of loot point rewards on perceived fairness of the point reward scheme. A graphical presentation of the results can be found in Figure 4.

The follow-up planned contrast analysis of the ANOVA in Table 6 provides evidence for H2 (Panel B, F = 8.76, $p < 0.01$, two-tailed), which describes that during a repetitive work process, individuals feel less fair about the point reward scheme when they are rewarded with loot point rewards than when they are rewarded with fixed point rewards of the equivalent amount.

The effect of H2 is also found in the path analysis (Table 10). When cash value is absent, *Point Reward Unpredictability* has a significant negative association with *Fairness of Point Scheme* (β = -0.29, *SE* = 0.48, p <0.01, two-tailed). By contrast, when cash value is present, the path from *Point Reward Unpredictability* to *Fairness of Point Scheme* is insignificant (β = -0.08, *SE* = 0.54, p = 0.40, two-tailed). The *z*-statistics that compares the coefficients of the path from *Point Reward Unpredictability* to *Fairness of Point Scheme* between the two *Cash Value of Point Reward* conditions is not significant either (z = 1.36, p = 0.17, two-tailed, untabulated). Overall, it seems that the negative effect of *Point Reward Unpredictability* on *Fairness of Point Scheme* weakens when cash value is attached. Thus, H4 is not supported.

5.5.3 Test of Research Questions 1 and 2

My first research question (RQ1) asks how, during a repetitive work process, will individuals' disengagement be impacted when they are rewarded with loot point rewards than when they are rewarded with fixed point rewards of the equivalent amount. I run an ANOVA

followed by a planned contrast analysis (Table 7) with *Point Reward Unpredictability* and *Cash Value of Point Reward* as independent variables and *Disengagement* as the dependent variable. Figure 5 displays the ANOVA results graphically.

According to Panel A, Table 7, neither *Point Reward Unpredictability* nor *Cash Value of Point Reward* has a significant simple effect. The interaction term is not significant either. Thus, individuals' experience of disengagement does not differ under the two types of point reward schemes (Panel B, F = 1.38, p = 0.24, two-tailed).

Results from the path analysis (Table 10) explains the insignificant effect on *Disengagement.* When cash value is not attached to point rewards, the path from *Task Attractiveness* to *Disengagement* is negative and significant (β = -0.52, *SE* = 0.08, p = < 0.01, two-tailed), and *Fairness of Point Scheme* is negatively associated with *Disengagement* with moderate significance (β = -0.15, *SE* = 0.08, p = 0.07, two-tailed). It is reasonable to infer that disengagement does not vary under the two types of point reward schemes because the positive impact from an increase in perceived task attractiveness (indirect effect: -0.33, p = 0.05, untabulated) and the negative impact from a decrease in perceived fairness of the point reward scheme (indirect effect: 0.44, p = 0.08, untabulated) counteract each other.

The planned contrast analysis of the ANOVA (Table 7) suggests no significant difference in individuals' experience of disengagement when they are rewarded with loot versus fixed points (Panel B, F = 0.52, p = 0.47, two-tailed). This provides the answer to my second research question (RQ2). I find that, during a repetitive work process, individuals' disengagement is similar when they are provided with loot point rewards with cash value attached, compared with when they are provided with fixed point rewards of the equivalent amount.

Looking at results from the path analysis (Table 10), when cash value is attached to points, neither *Task Attractiveness* (β = -0.05, *SE* = 0.48, p = 0.65, two-tailed) nor *Fairness of Point Scheme* (β = -0.08, *SE* = 0.54, p = 0.40, two-tailed) has a significant relationship with *Point Reward Unpredictability*. Moreover, *Task Attractiveness* is negatively associated with *Disengagement* (β = -0.60, *SE* = 0.08, $p < 0.01$, two-tailed), and *Fairness of Point Scheme* does not have a significant connection with *Disengagement* (β = 0.07, *SE* = 0.06, p = 0.40, two-tailed). Given that most of the above paths are insignificant, when point rewards carry cash value, it seems that the role of disengagement is not as important as expected.

5.5.4 Test of Research Questions 3 and 4

My third research question (RQ3) taps into the effect of loot point rewards on performance. Specifically, it asks how, during a repetitive work process, will individuals' performance be impacted when they are provided with loot point rewards compared with when they are provided with fixed point rewards of the equivalent amount. I conduct a repeated-measures ANCOVA (Table 8) followed by a planned contrast analysis to investigate this question. In this ANCOVA, the independent variables are *Point Reward Unpredictability* and *Cash Value of Point Reward*, the dependent variable is *Performance (Total)*, and the within-subject variable is *Period*. The results are provided in graphical form in Figure 6. Although not hypothesized, the ANCOVA suggests a significant interaction between *Point Reward Unpredictability* and *Cash Value of Point Reward* (Panel A, F = 4.48, p = 0.04, two-tailed).

In addition, as shown by the within-subject analysis results (Panel A, Table 8), there is no evidence of a period effect across the two 20-minute performance periods. The *p*-value for the interaction term *Period* by *Point Reward Unpredictability* is 0.11 (F = 2.59, two-tailed), 0.75 for

Period by *Cash Value of Point Reward* (F = 0.11, two-tailed), and 0.12 for *Period* by *Point Reward Unpredictability* by *Cash Value of Point Reward* (F = 2.49, two-tailed). The effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on performance in the first and the second period are discussed in more detail in Section 5.6.

I find that, when cash value of point reward is absent, individuals' performance does not differ significantly between the fixed and loot point rewards conditions (Panel B, Table 8, F = 0.29, p = 0.59, two-tailed). A plausible explanation for the insignificant result is that the net effect between increased perceived task attractiveness and decreased perceived fairness on *Disengagement* extends to performance. Further, the indirect effect (untabulated) from *Point Reward Unpredictability* to *Performance (Total)* through *Disengagement* is 0.11 (p = 0.31) and the direct effect (Panel B, Table 10) is -0.05 (p = 0.42), which neutralizes the total effect (untabulated) to 0.04 (p = 0.54). The direct path from *Point Reward Unpredictability* to *Performance (Total)* is not significant (Panel B, Table 10, β = -0.07, SE = 8.01, p = 0.42, two-tailed).

Regarding RQ4, on the contrary, the planned contrast analysis in the above ANCOVA (Table 8) indicates a significant effect of loot point rewards on total performance (Panel B, F = 6.13, p = 0.01, two-tailed). Result from the path analysis (Table 10) provides insight into this finding. Specifically, the indirect paths from *Point Reward Unpredictability* to *Performance (Total)* through *Task Attractiveness* (β = -0.05, SE = 0.48, p = 0.65, two-tailed) and through *Fairness of Point Scheme* (β = -0.08, SE = 0.54, p = 0.40, two-tailed) are both insignificant. However, the direct path from *Point Reward Unpredictability* to *Performance (Total)* is significant (β = 0.22, SE = 7.63, p = 0.01, two-tailed). Thus, when cash value is attached to point rewards, despite the fact that the unpredictability of point rewards does not affect task attractiveness and fairness

perceptions significantly, it increases performance, potentially through other mechanisms such as loss aversion. This finding is consistent with some economics studies (e.g., Corgnet and Hernán-González 2019; Sloof and Van Praag 2010), which shows that to ensure against uncertainty, individuals sometimes exert more effort and thereby achieve better performance.

5.6 Supplementary Analyses

5.6.1 Performance in Period 1 and 2

In Table 8, the interaction effects of *Period* by *Point Reward Unpredictability* (F = 2.59, $p = 0.11$, two-tailed) and *Period* by *Cash Value of Point Reward* by *Point Reward Unpredictability* (F = 2.49, $p = 0.12$, two-tailed) are approaching significance. Therefore, I run two separate ANCOVAs with performance from each period as the dependent variables with follow-up planned contrast analyses to further examine the main effects. Results are reported in Table 9 and illustrated in Figure 7.

Recall that in Table 8, *Cash Value of Point Reward* has a significant main effect and *Point Reward Unpredictability* does not. Different from those findings, Table 9 indicates that within the first performance period, both *Point Reward Unpredictability* (Panel A, F = 4.06, $p = 0.05$, two-tailed) and *Cash Value of Point Reward* (Panel A, F = 6.10, $p = 0.01$, two-tailed) have a significant main effect on performance. The significant interaction effect between *Point Reward Unpredictability* and *Cash Value of Point Reward* observed in Table 8 appears to exist only in Period 2 (Panel A, Table 9, F = 5.72, $p = 0.02$, two-tailed), because the same interaction term in Period 1 is not significant (Panel A, Table 9, F = 2.62, $p = 0.11$, two-tailed). In addition, in the second performance period, *Cash Value of Point Reward* has a moderately significant main effect (Panel A, Table 9, F = 3.88, $p = 0.05$, two-tailed).

The follow-up planned contrast analyses show that, analogous to Table 8, those main effects are primarily driven by the difference in the effect of *Point Reward Unpredictability* on performance when *Cash Value of Point Reward* is present (Panel B, Table 9, F = 8.03, $p < 0.01$, two-tailed, for Period 1; F = 7.49, $p < 0.01$, two-tailed, for Period 2). In other words, when cash value is attached to point rewards, individuals' performance pattern is quite similar across the two periods. Individuals in the *Point Reward Unpredictability (Loot)* condition consistently perform better than those in the *Point Reward Unpredictability (Fixed)* condition.

Without cash value attached, no significant effect of *Point Reward Unpredictability* on performance is observed in the first performance period (Panel B, Table 9, F = 0.59, $p = 0.44$, two-tailed). In the second performance period, however, I find a marginally significant effect of *Point Reward Unpredictability* on performance (Panel B, Table 9, F = 2.85, $p = 0.09$, two-tailed), which is not observed in the planned contrast analysis in Table 8. Note that, in this period, individuals who are rewarded with loot point rewards perform *worse* than those who are rewarded with fixed point rewards. The contrast between the two periods implies that the motivating effect of loot points may be short term.

5.6.2 Fairness of Cash Scheme

Recall the findings from H4. Specifically, when cash value of point rewards is present, individuals do not perceive the point reward scheme as less fair when they are given loot point rewards than when they are given fixed point rewards of the equivalent amount. It is likely that when cash value is attached to the points, task outcome instead of task process is highlighted and

individuals' concentration with respect to their compensation outcome is on cash rewards instead of on point rewards.[35]

I measure individuals' perceived fairness of the cash scheme. On a 11-point Likert scale, participants answer the extent to which they agree with this statement: "I think the cash reward scheme is fair." (1= "strongly disagree" and 11= "strongly agree"). I find that participants indeed perceive the cash scheme as less fair when they are provided with loot point rewards condition than when they are provided with fixed point rewards (Mean = 7.00 vs. 7.92, $p = 0.07$, two-tailed, untabulated). This finding indicates that, when cash value is attached, although the unpredictability of point rewards does not change the perceived fairness of the point compensation scheme, it negatively impacts the fairness perception of the cash compensation scheme.

Further, I conduct regression analyses (untabulated) to examine whether the difference in perceived fairness of cash compensation scheme impacts *Performance (Total), Performance (Period 1)* and *Performance (Period 2)*, respectively. Results show that individuals' fairness perception of cash compensation is not significantly related to any of the performance variables ($\beta = -0.39$, $t = -0.47$, $p = 0.64$, two-tailed, for *Performance (Total),* $\beta = -0.13$, $t = -0.16$, $p = 0.88$, two-tailed, for *Performance (Period 1),* $\beta = -0.06$, $t = -0.71$, $p = 0.48$, two-tailed, for *Performance (Period 2)*).

[35] See Section 3.3 for detailed discussion of the rationale for this inference.

5.6.3 Comparison of Mean *Performance (Total)* Between Different Financial Risk Attitudes Groups When Cash Value is Attached to Point Rewards

To examine the relationship between individuals' financial risk attitudes and their performance, I compare the mean performance of risk averse, risk neutral and risk seeing individuals in fixed and loot point rewards conditions, respectively, in the context when cash value is attached to point rewards. Results are reported in Table 11.

On average, individuals are risk averse in both fixed and loot point rewards conditions (Average Financial Risk Attitude < 2). Specifically, I find that risk averse individuals deliver *better* performance when they receive loot point rewards than when they receive fixed point rewards (t = -3.44, $p < 0.01$, two-tailed). This finding challenges the general belief that risk averse individuals are more motivated by predictable rewards than unpredictable rewards. Meanwhile, it provides some evidence that loss aversion may be the driver of performance variation when cash value is attached to point rewards (see Section 5.5).

Further, I find that the performance of risk neutral individuals does not differ significantly between the fixed and loot point rewards conditions (t = -0.49, p = 0.63, two-tailed). However, this finding should be interpreted with caution as the sample sizes are small (N=10 and N=5, respectively). Although t-test points to a worse performance of risk seeking individuals in the loot rewards condition than in the fixed rewards condition (t = 2.17, p = 0.10, two-tailed), this result may not be reliable, also due to the extremely small sample size (N=4 and N=2, respectively).

5.7 Robustness Check

5.7.1 The Impact of *Ability* as a Covariate

To test the impact of including *Ability* as a covariate in the main analyses, I run the ANCOVAs and the path analysis in Table 8-10 without *Ability*. As Table 12-14 shows, inferences for all my predictions and research questions are statistically similar. Therefore, the results in Table 8-10 are robust.

5.7.2 The Impact of *Financial Risk Attitude*, *Age* and *Work Experience* as Covariates

Since *Financial Risk Attitude*, *Age* and *Work Experience* differ between conditions, I investigate the impact of their inclusion in the ANOVAs, the ANCOVAs and the path analysis in Section 5.5. The results are discussed below (untabulated).

In the ANOVA (testing the effect of *Point Reward Unpredictability* on *Task Attractiveness)*, the *p*-value for *Financial Risk Attitude* is 0.60 (F = 0.28, two-tailed), for *Age* is 0.28 (F = 1.18, two-tailed) and for *Work Experience* is 0.01 (F = 6.69, two-tailed). Overall, the results do not differ inferentially from those in Table 5. Specifically, the *p*-value for *Point Reward Unpredictability* is 0.36 (F = 0.84, two-tailed), for *Cash Value of Point Reward* is 0.71 (F = 0.14, two-tailed), and for their interaction term is 0.10 (F = 2.71, two-tailed).

Likewise, in the ANOVA (testing the effect of *Point Reward Unpredictability* on *Fairness of Point Scheme)*, the *p*-value for *Financial Risk Attitude* is 0.24 (F = 1.39, two-tailed), for *Age* is 0.24 (F = 1.38, two-tailed) and for *Work Experience* is 0.68 (F = 0.18, two-tailed). Results do not differ inferentially from those in Table 6 either. Specifically, the *p*-value for *Point Reward*

Unpredictability is 0.01 (F = 6.90, two-tailed), for *Cash Value of Point Reward* is 0.75 (F = 0.11, two-tailed), and for their interaction term is 0.19 (F = 1.74, two-tailed).

Similarly, in another ANOVA where *Disengagement* is the dependent variable, the *p*-value for *Financial Risk Attitude* is 0.44 (F = 0.56, two-tailed), for *Age* is 0.67 (F = 0.19, two-tailed) and for *Work Experience* is 0.30 (F = 1.08, two-tailed). Findings in Table 7 also hold when the three variables are included in the analysis. Specifically, the *p*-value for *Point Reward Unpredictability* is 0.73 (F = 0.12, two-tailed), for *Cash Value of Point Reward* is 0.43 (F = 0.63, two-tailed), and for their interaction term is 0.19 (F = 1.74, two-tailed).

Lastly, when *Performance (Total)* is the dependent variable, the *p*-value for *Financial Risk Attitude* is 0.19 (F = 1.71, two-tailed), for *Age* is 0.76 (F = 0.09, two-tailed) and for *Work Experience* is 0.76 (F = 0.10, two-tailed). Again, findings in Table 8 hold when including those three variables in the analysis. Specifically, the *p*-value for *Point Reward Unpredictability* is 0.12 (F = 2.46, two-tailed), for *Cash Value of Point Reward* is 0.03 (F = 4.81, two-tailed), and for their interaction term is 0.03 (F = 4.86, two-tailed). Overall, my results from the main analyses are robust.

5.8 Summary

In this section, I formally test my hypotheses and investigate my research questions using ANOVAs, ANCOVAs and path analyses. I find that individuals indeed perceive the decoding task as more attractive when they are provided with loot point rewards than when they are provided with fixed point rewards of the equivalent amount (H1). Further, attaching cash value to point rewards attenuates the positive effect of loot point rewards on perceived task attractiveness (H3). With respect to perceived fairness of the point reward scheme, results show that individuals

perceive the reward scheme as less fair when they are provided with loot point rewards than when they are provided with fixed point rewards of the equivalent amount (H2). Attaching cash value to the points does not exacerbate the negative effect of loot point rewards on perceived fairness of the reward scheme (H4).

When examining the research questions, I find evidence that, when cash value is not attached, the positive impact from increased perceived task attractiveness and the negative impact from decreased perceived fairness of the point reward scheme counteract each other. As a result, a significant difference of individuals' disengagement is not observed (RQ1) between the loot and fixed point reward conditions. However, when cash value is attached, many of the paths from the unpredictability of point rewards leading to disengagement are insignificant, suggesting that disengagement may not be the motivating mechanism in this case (RQ2). In terms of performance, I fail to find a significant difference between the fixed and loot point reward conditions when cash value is not attached to point rewards (RQ3). On the contrary, with cash value attached, individuals in the loot point reward condition perform significantly better than those in the fixed point reward condition (RQ4). Given that disengagement is less likely to be the mechanism in this setting, it is plausible that individuals are motivated by other factors, such as loss aversion, as identified by some economic scholars (e.g., Corgnet and Hernán-González 2019; Sloof and Van Praag 2010).

In addition, I conduct supplementary analyses to examine the effects of loot point rewards and cash value of points on performance in Period 1 and 2, respectively. Also, I evaluate the effect of perceived fairness of the cash scheme on performance. Results suggest that when cash value is attached, individuals who receive loot point rewards achieve better performance than those who receive fixed point rewards in both periods. In contrast, without cash value attached, individuals in the loot point rewards condition deliver similar performance in Period 1 but worse performance

in Period 2, compared with those in the fixed point rewards condition. This implies that the positive effect of loot point rewards may be short term. Regarding perceived fairness of the cash scheme, I do not find that it is associated with performance.

Lastly, I check the robustness of the control variables that were found to be significantly different across all four conditions in the randomization testing. Overall, my findings hold whether those variables are either included or not. In the upcoming chapter, I provide concluding remarks that discuss the contributions and limitations of my study, which provide directions for future research.

CHAPTER 6: CONCLUSION

6.1 Introduction

Using an experiment, I examine the effectiveness of gamification to help employees stay motivated in repetitive work processes. I predict and find that loot, a type of spontaneous, unpredictable reward commonly seen in gamification, has a positive effect on perceived task attractiveness and a negative effect on fairness perception. In this chapter Section 6.2 summarizes my findings and their implications, Section 6.3 discusses the limitations of my study and suggests improvements for future research, and Section 6.4 highlights the contributions of this study.

6.2 Discussion of Results

Using a 2 x 2 between-subjects experimental design, I test four hypotheses and investigate four research questions. My first two hypotheses focus on the setting where the point rewards do not carry any cash value. Specifically, my first hypothesis (H1) predicts that during a repetitive work process, individuals perceive the task as more attractive when they are rewarded with loot point rewards than when they are rewarded with fixed point rewards of the equivalent amount. This hypothesis is motivated by findings in neuroscience research on how the human brain responds to unpredictability through the effect of dopamine, a neurotransmitter that signals the sensation of fun and excitement (Burgdorf and Panksepp 2006; Wang et al. 2013). Specifically, unpredictability stimulates the release of dopamine (e.g., Cohen et al. 2007; DeYoung 2013; Schultz 2007), making individuals feel that their focal repetitive work process is fun and exciting. Using an ANOVA followed by planned contrast analysis, I find support for my prediction. Individuals perceive the decoding work to be more attractive (e.g., more fun and exciting) when point rewards were unpredictable than when they were predictable. In a path analysis, I find further

support for H1. Overall, I find evidence that when used appropriately, unpredictability in point reward form can help increase the attractiveness of a boring, repetitive task.

With regards to the potential downside of unpredictable point rewards, my second hypothesis (H2) predicts that individuals are more likely to perceive the reward scheme as unfair when they are provided with loot point rewards than when they are provided with predictable point rewards of the equivalent amount. This prediction is motivated by theories about fairness perception (e.g., Adams 1965; Van den Bos and Lind 2002): uncertainty can intensify individuals' need for fairness, and when uncertainty is from an unpredictable point reward scheme, individuals may feel that their effort is not fairly rewarded. I test H2 in a similar fashion as H1. Both the planned contrast analysis and the path analysis results indicate a significant negative relationship between point reward unpredictability and perceived fairness of the point reward scheme. This evidence is consistent with the assumption from conventional economic research theories (e.g., Jensen and Meckling 1976) which proposes that individuals are often risk averse and expect their effort to be adequately measured and evaluated (Indjejikian 1999; Ittner and Larcker 2002). Therefore, managers should keep risk premium in mind when incorporating unpredictability to reward employees.

My third and fourth hypotheses (H3 and H4) pertain to the possible moderating effect of cash on the above two relationships (H1 and H2). H3 draws on the motivational crowding-out effect (see e.g., Deci 1971; Deci et al. 1999; Frey 1994; Ryan and Deci 2000b), which states that when a task has intrinsic value to individuals, a small amount of monetary reward can be demotivating, as the reward may be perceived as an external control, which then drives individuals to view the task as less attractive (Fessler 2003; Gagné and Deci 2005; Ryan and Deci 2000a). Specifically, H3 predicts that during a repetitive work process, attaching cash value to point

rewards attenuates the positive effect of unpredictable point rewards on perceived task attractiveness. My results show a marginally significant effect from cash on perceived task attractiveness. That is, attaching cash value to point rewards diminishes the positive effect of loot point rewards on perceived task attractiveness.

The theoretical base of H4 includes three aspects. First, the crowding-out effect results in an inferior intrinsic value of the task. To be satisfied, individuals expect a superior extrinsic payoff, e.g., more favorable outcomes from the unpredictable reward scheme (Murayama et al. 2010; Seymour and McClure 2008). Second, since money is instrumental and relevant to real life (Bonner and Sprinkle 2002), gaining or missing out point rewards with cash value may have a larger impact on individuals; for example, trigger stronger emotional reactions. Third, when point rewards carry cash value, the reward scheme becomes similar to a performance-contingent pay scheme, which is indicated by prior literature as associated with a negative fairness perception (Feltham and Xie 1994; Isaac 2001). Based on the above, H4 predicts that during a repetitive work process, attaching cash value to point rewards exacerbates the negative effect of unpredictable point rewards on perceived fairness of point reward scheme, compared with when point rewards have no cash value. I fail to find support that attaching cash value to point rewards exacerbates the effect of unpredictable point rewards on perceived fairness of the point reward scheme. In fact, the negative effect from unpredictable point rewards on fairness becomes weaker (rather than stronger) when cash value is attached to point rewards. I follow up my investigation and compare the difference of individuals' fairness perception of the cash scheme. This is because I suspect that, when cash value is attached to the point rewards, task outcome becomes more salient than task process, which directs individuals' attention from point rewards to cash rewards. I find that, as expected, individuals in the loot point rewards condition consider the cash reward scheme as less

fair than those in the fixed point rewards condition. However, the difference does not significantly affect performance.

My first two research questions (RQ1 and RQ2) pertain to the effect of loot point rewards on disengagement. RQ1 questions how, during a repetitive work process, will individuals' disengagement be impacted when they are provided with unpredictable point rewards compared with when they are provided with predictable point rewards of the equivalent amount. Results from ANOVAs and the path analysis show that when point rewards do not carry cash value, disengagement is not significantly different between fixed and loot point reward conditions. This is because the significant individual paths from point reward unpredictability to disengagement via perceived task attractiveness and via perceived fairness of point reward scheme are in opposite directions and thus counteract each other. Taken together, in a setting where cash is not attached to unpredictable point rewards, my findings demonstrate that individuals have mixed feelings towards unpredictability. On the one hand, they are naturally attentive to the psychological pleasure brought by unpredictability and appreciate the intrinsic value (e.g., fun and excitement) it adds to a repetitive process. On the other hand, they experience a violation of fairness facing that unpredictability, even when it does not impact their actual monetary payoff.

RQ2 questions how, during a repetitive work process, how will individuals' disengagement be impacted when they are provided with unpredictable point rewards with cash value attached, compared with when they are provided with predictable point rewards of the equivalent amount. When the points carry cash value, the planned contrast analysis shows no difference in individuals' disengagement when they received loot or fixed point rewards. Also, in the path analysis, all paths from point reward unpredictability to disengagement are insignificant, except for the one from perceived task attractiveness to disengagement, which is negative. Further, as discussed below, the

path from point reward unpredictability to performance is significant. Taken together, the results show that when the points carry cash value, the role of disengagement seems to be less important, and the motivation mechanisms are more complicated than the model can demonstrate.

Lastly, I question, with and without cash value attached, how performance will be impacted when individuals are provided with loot points compared with when they are provided with fixed point rewards, which consists of investigating my third and last research questions (RQ3 and RQ4). To answer these questions, I conduct repeated measures ANCOVA with planned contrast analysis while controlling for individuals' decoding ability. I find a significant effect of loot points only in conditions where cash value of points is present (RQ4) but not in conditions where cash value is absent (RQ3). The lack of finding in RQ3 is not surprising given the countervailing effects on task attractiveness and perceived fairness noted above. The results on RQ4, i.e., loot (vs. fixed) point rewards with cash value motivating higher performance, on the other hand, cannot be explained by psychological mechanisms I have focused on so far. Specifically, the path analysis results suggest that the effect of loot point rewards on performance is not driven by perceived task attractiveness or fairness of the point reward scheme; rather, there is a direct link between loot point rewards and performance. Therefore, the performance effect of loot points when cash value is attached may be explained by other mechanisms, such as loss aversion. There is evidence (e.g., Corgnet and Hernán-González 2019) that in the face of a noisy performance measure that may result in lower compensation, despite weaker incentives, individuals sometimes self-ensure against the risk by working harder.

6.3 Limitations and Implications for Future Research

My study has some limitations that warrant future research. First, despite that gamification applied in practice is often holistic and much more aesthetically pleasing, in order to cleanly test

the independent effect of unpredictable point rewards, my gamification manipulation is quite simple. To further enhance individuals' perceived task attractiveness and intrinsic motivation, future studies can add, for example, audio effect to the revelation of point reward outcomes. Moreover, my study only examines one game element. Future research may investigate whether other gamification techniques, such as badges, levels, and leaderboard, can be utilized in combination of point rewards to reduce employees' disengagement and improve their performance in repetitive tasks, or in comparison with loot points to examine the better means for harnessing boredom. Similarly, gamification may be used in conjunction with other traditional performance controls, such as goal setting, to have potentially stronger motivating effect on individuals. For instance, only after achieving a set performance goal can employees be eligible to earn extra loot point rewards.

Second, my findings on individuals' fairness perception of the point reward scheme indicate that, to provide insights into how loot points can be implemented without inducing fairness concerns among employees, some adjustments need to be made. For example, after completing every 10 decoding questions, the outcome could be adjusted to 2 or 8 points at 50% probability so that participants are shielded from non-gain outcomes. In that way, individuals' concerns like loss aversion could be alleviated. Alternatively, loot point rewards may be offered more frequently (e.g., after every 5 decoding questions) so that less effort investment is required leading to each reward outcome. Another way to possibly mitigate fairness concerns is to enable social comparison by providing participants with information such as the average point rewards received in the task. Future studies may examine whether participants justify their gain as fairer if they know that their peers receive a similar number of points as themselves.

Moreover, individuals may be provided with the opportunity to execute the realization of the outcome. For instance, let them select their favorite from two or more treasure chests. Since individuals tend to attribute desirable outcomes to internal factors and undesirable outcomes to external factors like bad luck (see self-serving attribution bias in Harvey and Weary 1984), this adjustment renders the illusion of control (Langer 1975), making individuals less likely to perceive the outcome of not winning any point rewards as an unfair treatment.

Third, when attaching cash value to point rewards, I find the motivating crowding-out effect, which reduces the positive effect of point rewards on task attractiveness. One improvement can be made to potentially mitigate the crowding-out effect is to extend the time between point reward gains and cash conversion so that individuals can focus more on the work process instead of the final outcome. Future research may examine whether the crowding-out effect becomes less significant if individuals convert the points into cash bi-weekly or monthly. Alternatively, to circumvent the direct connection between points and cash, managers may instead offer to convert point rewards to tangible rewards. For example, hedonic goods such as gift cards, movie tickets, restaurant, or spa coupons.

Fourth, in terms of methodology, I use a self-reported measure of disengagement after the completion of the main task to avoid sensitizing participants. It is possible to obtain direct evidence of the effect of point reward unpredictability on disengagement in other ways. For example, allowing participants to switch to a leisure task. The time spent on the leisure task can be used to gauge individuals' actual disengagement state.

Fifth, my results imply that the motivating effect of loot point rewards could be short-term. Future research may explore whether steadily increasing the size of loot point rewards (e.g., add 1 extra point to the loot gain per 20 questions completed) helps to prevent the positive effect from

diminishing over time. Longitudinal research may examine whether the effect can be maintained at its optimal level if managers apply loot point rewards for shorter but multiple periods. In addition, a field study may show different findings regarding individuals' fairness concerns of the loot point reward scheme. Because in a real organization, it is likely that a certain level of trust has been established between the employees and the organization. It will be interesting to investigate whether variance in individuals' trust level can lead to significant differences in their disengagement and performance. Specifically, whether individuals have high (low) trust in the organization will be less (more) disengaged and achieve high (low) performance. This is because their trust in the organization encourages them to believe that the unpredictable reward scheme reflects the organization's intention to make work more enjoyable for them. As a result, fairness concerns should be eased.

Lastly, in my study, the conversion rate between points and cash is small. Future research may investigate how disengagement and performance could be impacted when the rate is larger (e.g., 10 point = 1 Canadian dollar). Put it differently, using a larger conversion rate, individuals can possibly perceive their income from points as more similar to their base salary. Therefore, it is an empirical question as to whether individuals become more motivated as the stake increases, reducing the motivation crowding effect predicted by H3, or less motivated due to stronger concerns of fairness as predicted by H4. Also, given that individuals' risk attitude in a lottery setting has been found to vary when the stake increases from small to large (e.g., $4 to $200) (Holt and Laury 2002, 2005), the association between the scale of the conversion rate and performance is likely non-linear.

6.4 Contributions

My study makes three contributions to the literature. First, my research reconciles the inconsistent predictions drawn from different motivation theories about unpredictable rewards. By examining how unpredictable point rewards affect task attractiveness and fairness perceptions, I am able to disentangle the potential benefit and cost of unpredictable rewards. When cash value is not attached to the unpredictable point rewards, I find that they increase perceived task attractiveness but decrease perceived fairness of the point reward scheme, leading to an insignificant effect on one of the immediate outcomes of boredom, disengagement. As noted in the previous section, if measures can be taken to address their negative effect on perceived fairness, unpredictable (point) rewards can potentially be utilized to mitigate employees' boredom in repetitive tasks.

Second, one key summary variable in my research design is disengagement. My research thus answers the call that made by Presslee and his colleagues (2020) on measuring disengagement directly using a scale, instead of indirectly using engagement proxies, such as absenteeism and turnover rate. While previous investigation on (dis)engagement conducted by accounting scholars concentrates on employees' overall engagement at work (vs. engagement in a particular task) and mainly includes surveys and field experiments (e.g., Carrillo et al. 2017; Johnson and Pike 2018; Presslee et al. 2020; Zainol et al. 2016), my study is among the first to measure disengagement in a laboratory experiment. Though the net effect of loot point rewards on disengagement is insignificant in my study, my research still sheds light on the potential of using this gamification technique to harness boredom in repetitive work processes.

Third, my study contributes to management accounting literature by adding evidence of adopting novel rewards to motivate employees. In recent years, this stream of literature has been

growing steadily and results have been reported on tangible rewards (e.g., gift cards and points redeemable for merchandize, see Kelly et al. 2017; Presslee et al. 2013), intangible incentives (e.g., thank-you cards, see Presslee et al. 2020), and other affect-rich rewards (e.g., charity donation on behalf of employees, see Berger et al. 2019). Specifically, the novelty of my study is multifaceted. Conventionally, accounting literature has been focusing on the negative side of reward unpredictability. In this study, I highlight its positive effect and make contrast with its negative effect to show that both aspects are important determinants of (dis)engagement. Further, I demonstrate that loot point rewards make individuals more engaged when they do not have any monetary value, which implies that reward unpredictability taps into the psychological utility in individuals' thought process, and rewards with merely entertainment value can also be motivating. Moreover, my study builds on gamification research and presents the task to individuals in a gamification setting where the point rewards are like game rewards. This design is novel. As noted in Kelly et al. (2021), their study is the first to show that playing a virtual slot machine can incentivise greater effort in training tasks at work. I extend their study by taking the unpredictability component from various games and merge it into a repetitive work task. Operationalizing reward unpredictability in a gamification context is also necessary, because in games, unpredictability is typically considered fun and exciting, rather than concerning.

FIGURES

Figure 1. Experimental Conditions

	Cash Value of Point Reward (Absent)	***Cash Value of Point Reward (Present)***
Point Reward Unpredictability (Fixed)	Fixed point rewards without cash value	Fixed point rewards with cash value
Point Reward Unpredictability (Loot)	Loot point rewards without cash value	Loot point rewards with cash value

Summary of experimental conditions:

Fixed point rewards without cash value: In this condition, every time after completing 10 decoding questions, participants receive 5 points. The points cannot be converted to cash at the end of the experiment.

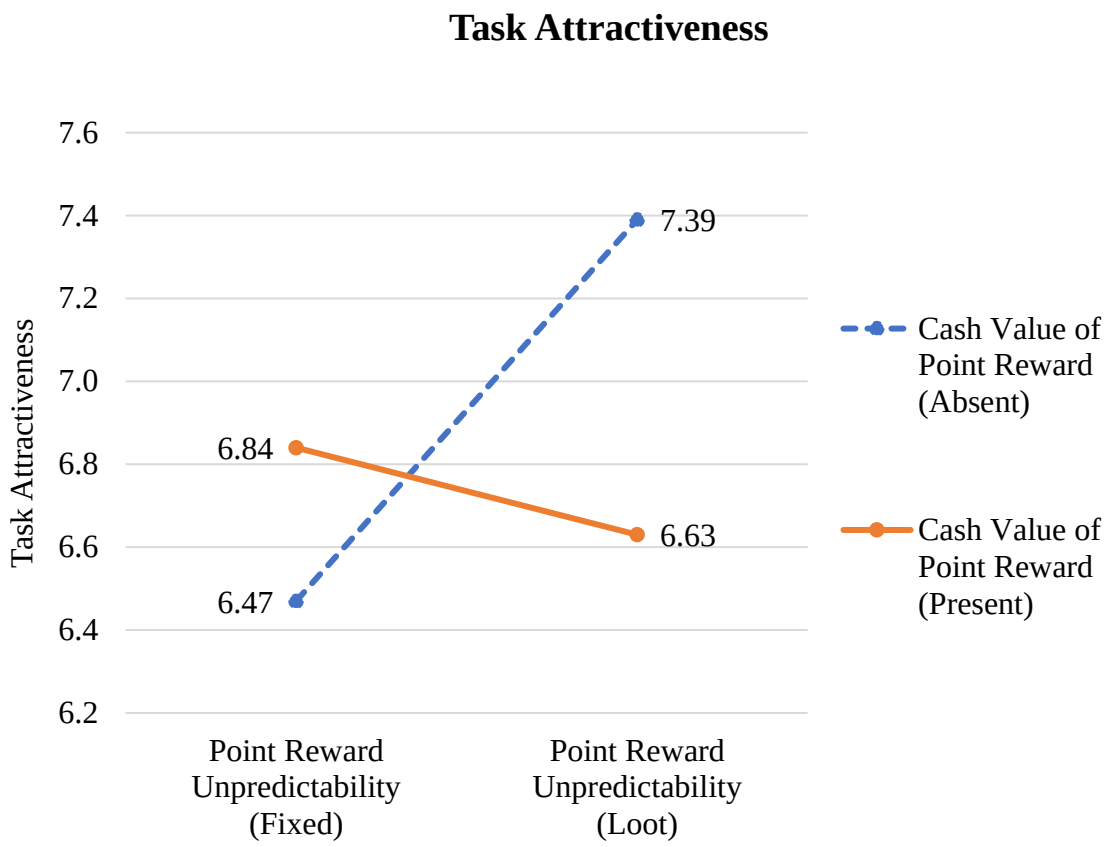
Fixed point rewards with cash value: In this condition, every time after completing 10 decoding questions, participants receive 5 points. The points can be converted to cash at a rate of 1 point = 0.005 Canadian Dollars at the end of the experiment.

Loot point rewards without cash value: In this condition, every time after completing 10 decoding questions, participants receive either 0 or 10 points at 50% probability. The points cannot be converted to cash at the end of the experiment.

Loot point rewards with cash value: In this condition, every time after completing 10 decoding questions, participants receive either 0 or 10 points 50% probability. The points can be converted to cash at a rate of 1 point = 0.005 Canadian Dollars at the end of the experiment.

Figure 2. Experimental Procedures

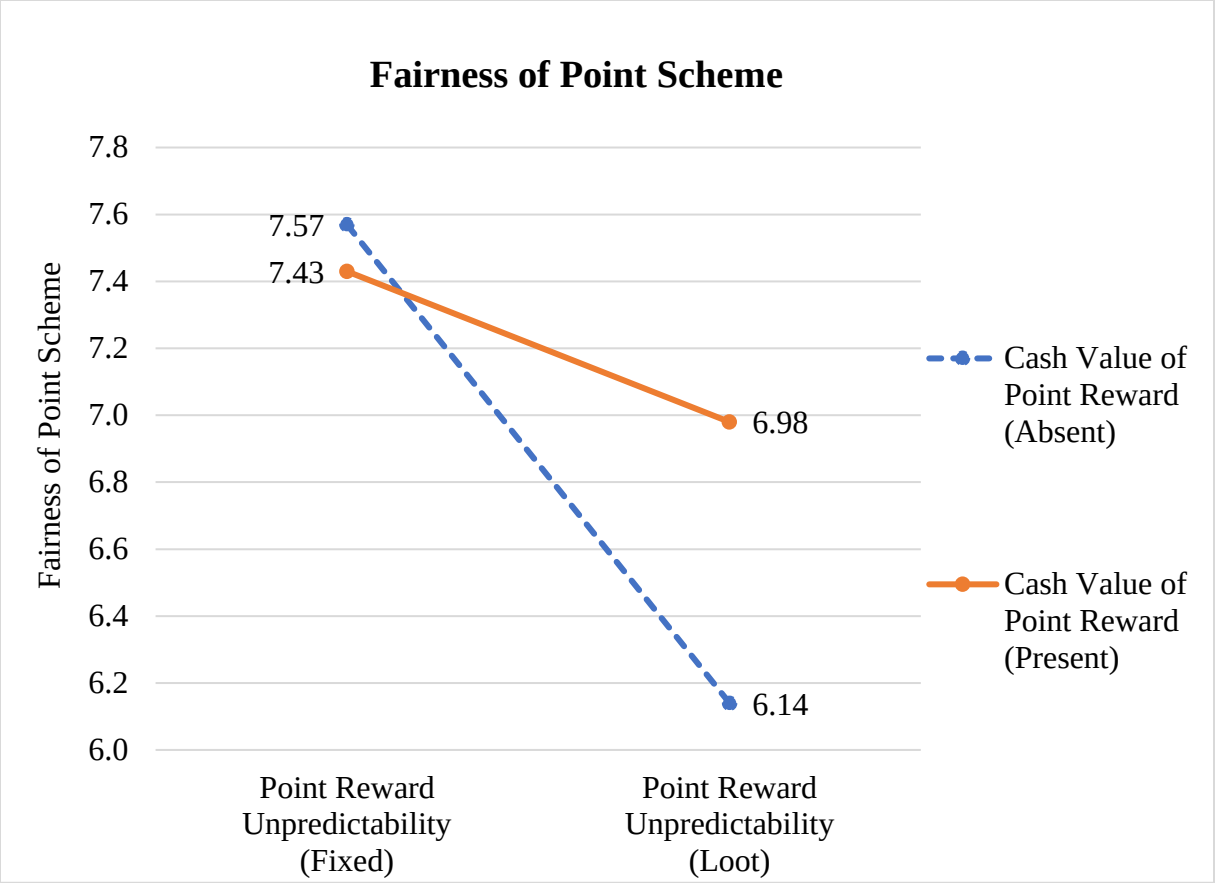
Figure 3. Effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on *Task Attractiveness*



Notes:

The values in this figure are the estimated marginal means. *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?". In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

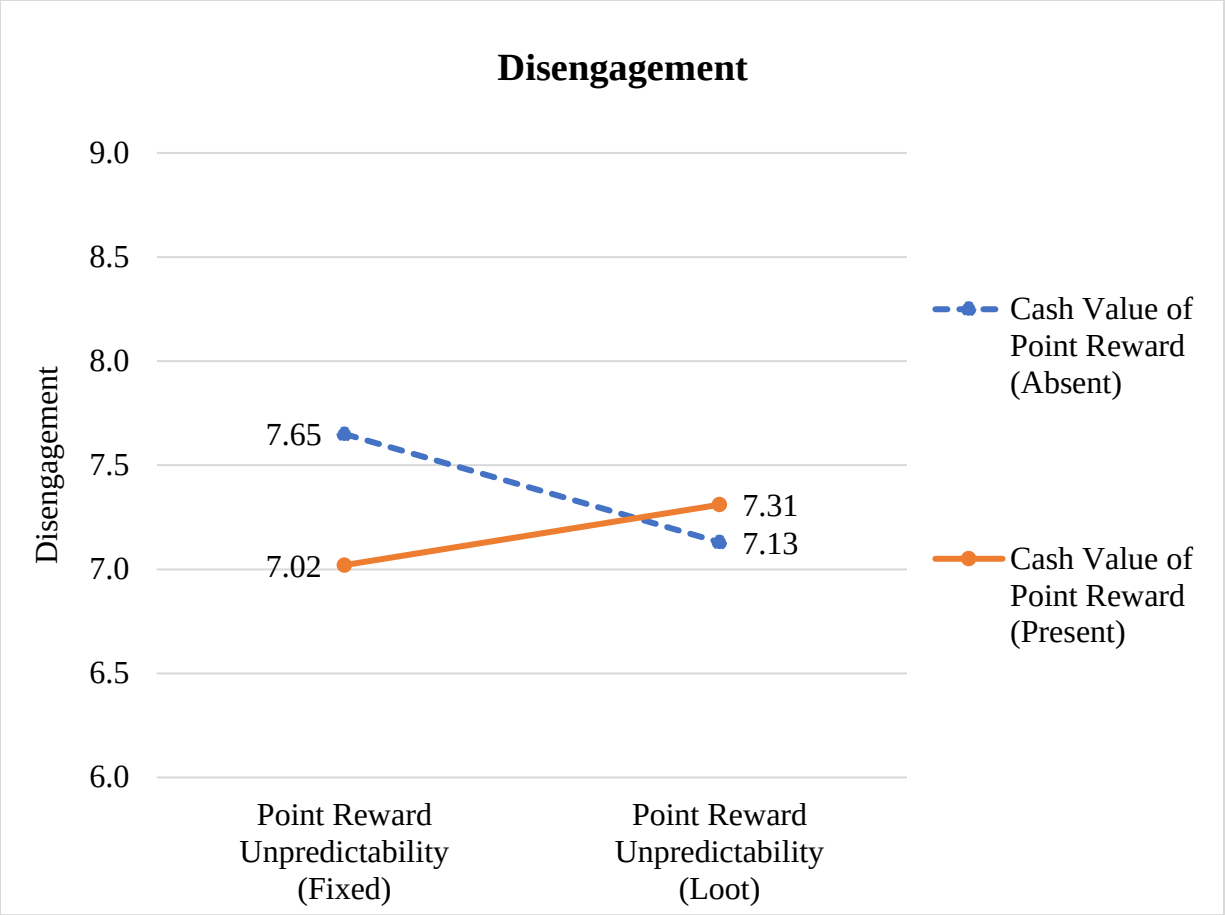
Figure 4. Effects of Point *Reward Unpredictability* and *Cash Value of Point Reward* on *Fairness of Point Scheme*



Notes:

The values in this figure are the estimated marginal means. *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair.". In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

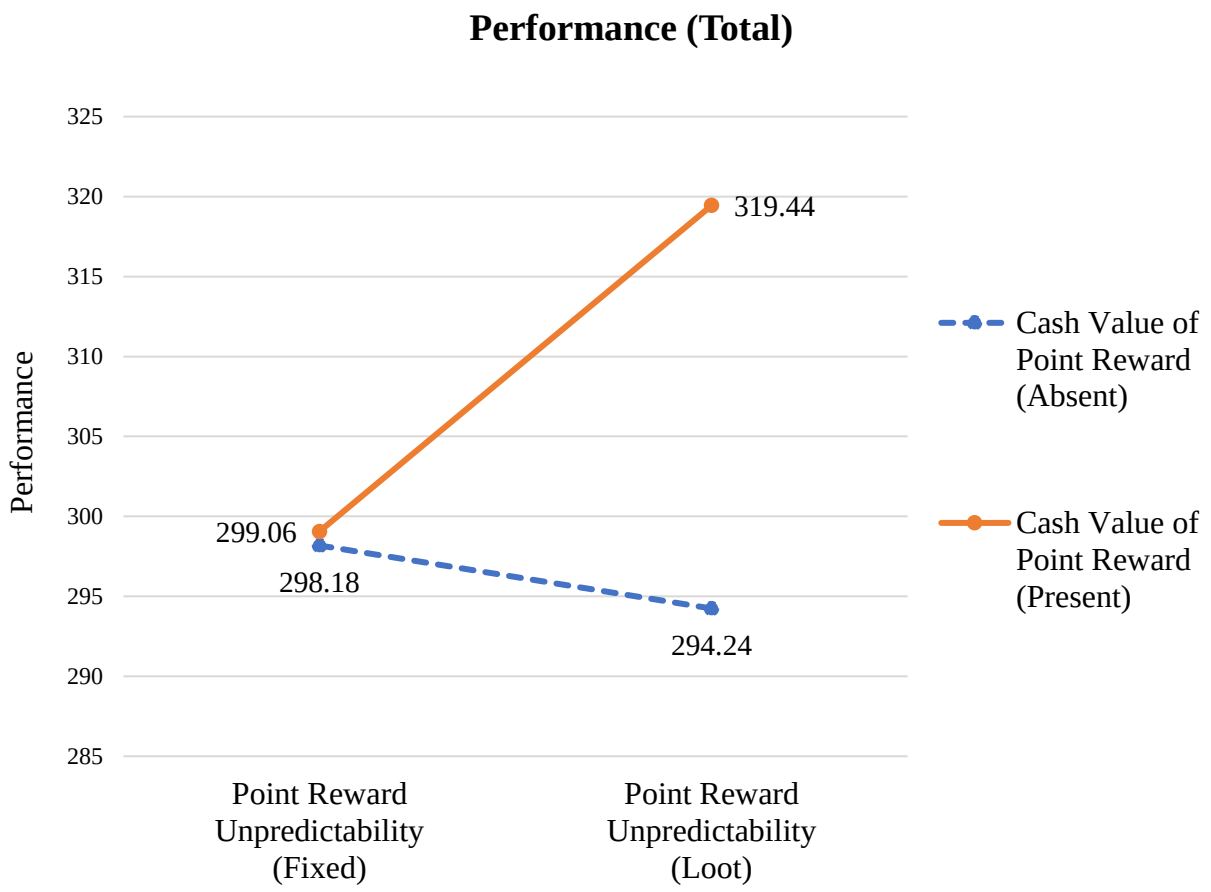
Figure 5. Effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on *Disengagement*



Notes:

The values in this figure are the estimated marginal means. *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83). In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

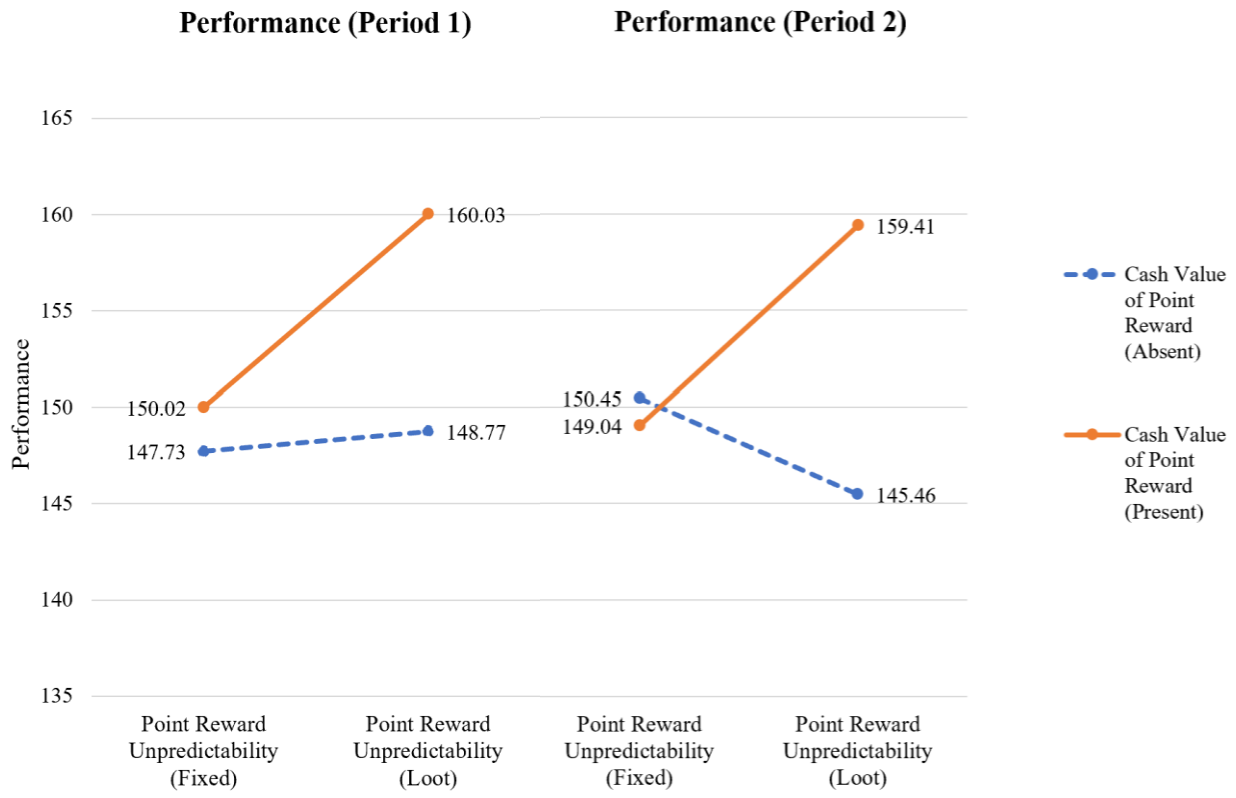
Figure 6. Effects of *Point Reward Unpredictability* and *Cash Value of Point Reward* on *Performance (Total)*



Notes:

The values in this figure are the estimated marginal means. *Performance (Total)* is measured by the number of decoding questions completed in both formal periods. In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

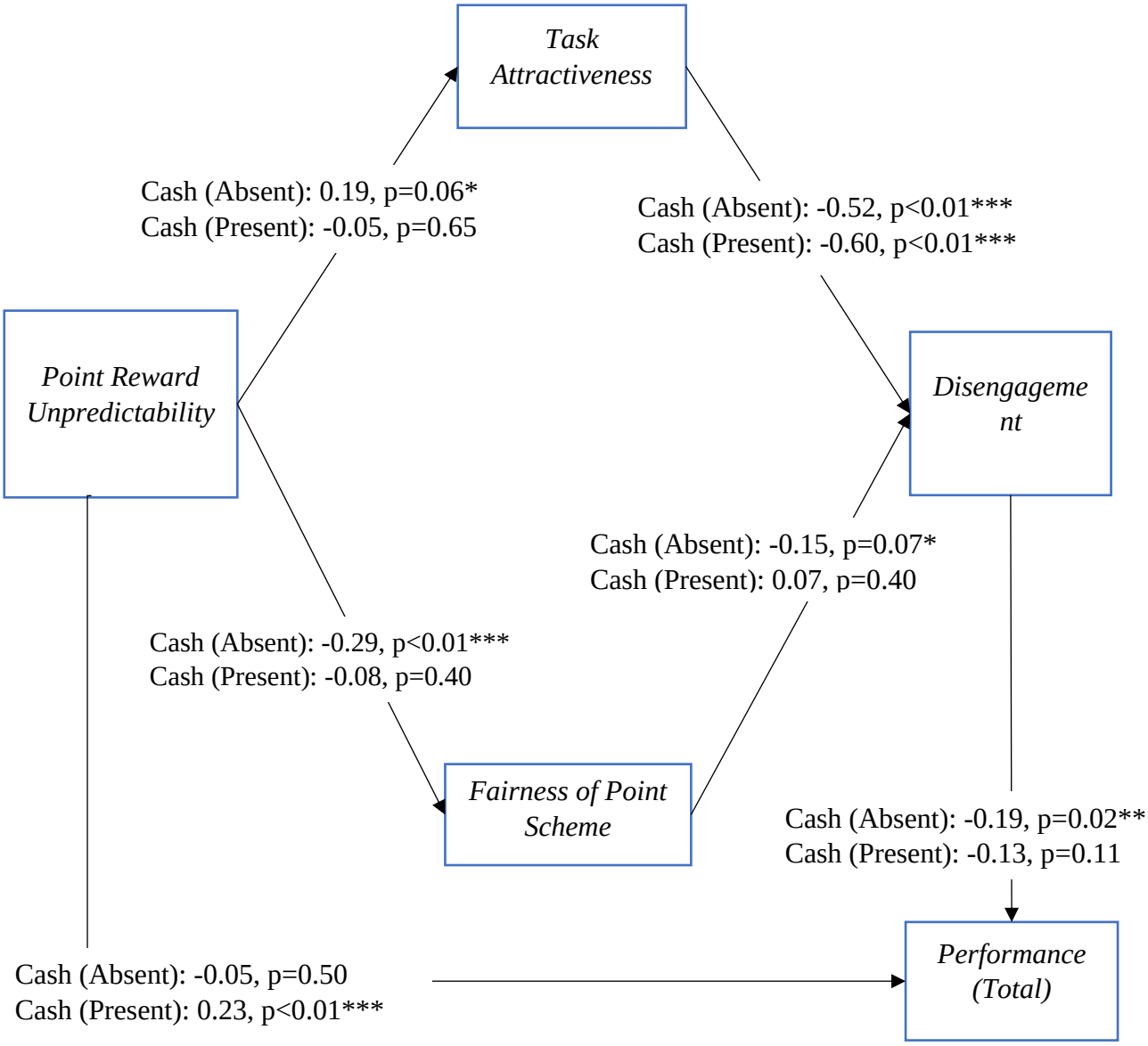
Figure 7. Performance Between Two Periods by Condition



Notes:

The values in this figure are the estimated marginal means. *Performance (Period 1)* is measured by the number of decoding questions completed in the first 20-minute performance period. *Performance (Period 2)* is measured by the number of decoding questions completed in the second 20-minute performance period. In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Figure 8. Coefficients of Multiple Group Path Analysis



Notes:

Model fit indices: χ^2 (16) = 20.87, p= 0.19; CFI = 0.97; TLI= 0.95; NFI= 0.90; RMSEA= 0.04; Standardized RMR= 0.07. This model is specified so that all structural paths are allowed to vary between the *Cash Value of Point Reward (Absent)* and *Cash Value of Point Reward (Present)* groups. *Ability* is controlled for in the model. * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0

or 10 points at a 50/50 chance for every 10 decoding questions completed. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned. *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?". *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair.". *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83). *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

TABLES

Table 1. Summary of Analyses and Results

Test	Effect Tested	Predicted Sign	Actual Sign	Prediction supported?
H1	*Point Reward Unpredictability* ➔ *Task Attractiveness* (simple effect when *Cash Value of Point Reward* is absent)	+	+	Yes
H2	*Point Reward Unpredictability* ➔ *Fairness of Point Scheme* (simple effect when *Cash Value of Point Reward* is absent)	-	-	Yes
H3	*Point Reward Unpredictability*Cash Value of Point Reward* ➔ *Task Attractiveness*	-	-	Yes
H4	*Point Reward Unpredictability*Cash Value of Point Reward* ➔ *Fairness of Point Scheme*	-	Not significant	No
RQ1	*Point Reward Unpredictability* ➔ *Disengagement* (simple effect when *Cash Value of Point Reward* is absent)	?	Not significant	n/a
RQ2	*Point Reward Unpredictability* ➔ *Disengagement* (simple effect when *Cash Value of Point Reward* is present)	?	Not significant	n/a
RQ3	*Point Reward Unpredictability* ➔ *Performance (Total)* (simple effect when *Cash Value of Point Reward* is absent)	?	Not significant	n/a
RQ4	*Point Reward Unpredictability* ➔ *Performance (Total)* (simple effect when *Cash Value of Point Reward* is present)	?	+	n/a

Notes:

Point Reward Unpredictability include fixed and loot conditions. In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point*

Reward Unpredictability (Loot) conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed. *Cash Value of Point Reward* include absent and present conditions. In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned. *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?". *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair.". *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83). *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

Table 2. Exploratory Factor Analyses of *Task Attractiveness*[1] and *Disengagement*[2]

Panel A: *Task Attractiveness*

Item	Standardized Factor Loading
1="extremely repulsive/ dull/ tedious"; 11 ="extremely attractive/ exciting/ fun"	
Please share with us your thoughts on the decoding task (game) you just tried:	
1. Was it attractive or repulsive?	0.87
2. Was it exciting or dull?	0.92
3. Was it fun or tedious?	0.92
Eigenvalue	**2.45**
Variance Explained	**81.54%**
Cronbach's α	**0.88**

Panel B: *Disengagement*

Item	Standardized Factor Loading
1="strongly disagree"; 11="strongly agree"	
1. I seemed to be forced to do things that had no value to me	0.80
2. I wanted to do something fun, but nothing appealed to me.	0.88
3. I wish I were doing something more exciting.	0.90
Eigenvalue	**2.24**
Variance Explained	**74.73%**
Cronbach's α	**0.83**

[1] Scale is adapted from Fessler (2003). Measured at the end of the practice period.

[2] Scale is adapted from Fahlman et al. (2013). Measured at the end of the lab experiment.

Table 3. Means [standard deviation] of individual difference variables by Condition

	Cash Value of Point Reward (Absent)[1]		*Cash Value of Point Reward (Present)*		
	Point Reward Unpredictability (Fixed)[2]	Point Reward Unpredictability (Loot)	Point Reward Unpredictability (Fixed)	Point Reward Unpredictability (Loot)	Overall Average
Gender[3]	49% [0.51]	49% [0.51]	43% [0.54]	63% [0.49]	54% [0.51]
Age[4]	19.72 [0.85]	19.71 [0.81]	20.39 [1.74]	20.14 [1.02]	19.99 [1.20]
Work Experience[5]	14.13 [11.12]	12.65 [10.88]	21.79 [21.87]	23.25 [19.18]	17.98 [17.07]
Weekly Gaming Hours[6]	9.09 [13.42]	10.76 [15.71]	8.53 [14.73]	9.96 [13.21]	9.59 [14.23]
Financial Risk Attitude[7]	10.09 [5.27]	9.76 [5.24]	9.04 [5.80]	7.41 [4.72]	9.07 [5.34]
N =	**47**	**51**	**51**	**49**	**198**

[1] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[2] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[3] *Gender* is the proportion of participants who identified themselves as female in the online survey.

[4] *Age* describes participants' average age in years stated in the online survey.

[5] *Work Experience* describes participants average work experience in months stated in the online survey.

[6] *Weekly Gaming Hours* describes participants' average number of hours per week spent on playing games on devices including mobile phone, tablet and computer stated in the online survey.

[7] *Financial Risk Attitude* is a scale from Dohmen et al. (2011) which contains 19 questions of two options between a fixed amount of monetary gain from $10 to $200 at $10 intervals, and a lottery that has an expected gain of $150. For each question, participants choose from the two options. The value of this variable is 15 for risk neutral participants, from 1 to 14 for risk averse participants and from 16 to 19 for risk seeking participants.

Table 4. Means [standard deviation] of *Performance*, Total Point Earnings, *Task Attractiveness*[1], *Fairness of Point Scheme*[2], *Disengagement*[3], and *Ability*[4] by Condition

	Cash Value of Point Reward (Absent)[5]		*Cash Value of Point Reward (Present)*		
	Point Reward Unpredictability (Fixed)[6]	Point Reward Unpredictability (Loot)	Point Reward Unpredictability (Fixed)	Point Reward Unpredictability (Loot)	Overall Averages
Performance (Period 1)[7]	147.73 [19.34]	148.77 [19.36]	150.02 [19.31]	160.03 [19.33]	151.64 [19.34]
Performance (Period 2)[8]	150.45 [22.43]	145.46 [22.45]	149.04 [22.39]	159.41 [22.41]	151.09 [22.43]
Performance (Total)[9]	298.18 [40.15]	294.24 [40.18]	299.06 [40.07]	319.44 [40.11]	302.65 [40.15]
Total Point Earnings[10]	147.45 [26.37]	135.69 [24.92]	144.02 [24.52]	154.08 [26.05]	145.18 [26.13]
Task Attractiveness	6.47 [2.47]	7.39 [2.36]	6.84 [2.40]	6.63 [2.44]	6.84 [2.42]
Fairness of Point Scheme	7.57 [1.92]	6.14 [2.77]	7.43 [2.67]	6.98 [2.72]	7.02 [2.60]
Disengagement	7.65 [2.27]	7.13 [2.13]	7.02 [2.07]	7.31 [1.89]	7.27 [2.09]
Ability	18.40 [2.64]	17.41 [3.13]	17.65 [2.99]	18.33 [3.19]	17.93 [3.01]
N =	**47**	**51**	**51**	**49**	**198**

[1] *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?"

[2] *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair."

[3] *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83).

[4] *Ability* is measured by the number of decoding questions completed in the 2-minute practice period.

[5] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[6] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[7] *Performance (Period 1)* is the number of decoding questions completed in the first performance period.

[8] *Performance (Period 2)* is the number of decoding questions completed in the second performance period.

[9] *Performance (Total)* is the number of decoding questions completed in both performance periods.

[10] Total Point Earnings is the total number of points participants have earned in the two performance periods.

Table 5. Results for *Task Attractiveness*[1] – Test of H1 and H3

Panel A: ANOVA

Source of variance	**df**	**MS**	**F**	***p*-value**[2]
Between Subjects:				
Point Reward Unpredictability (Fixed vs. Loot)[3]	1	6.06	1.04	0.31
Cash Value of Point Reward (Absent vs. Present)[4]	1	1.83	0.31	0.58
H3: *Point Reward Unpredictability*Cash Value of Point Reward*	1	15.92	2.72	0.10*
Error	194	5.85		

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
H1: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	20.59	3.53	0.06*
Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	1.18	0.20	0.66

[1] *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?".

[2] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[3] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decodes completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[4] In the *Point Cash Value of Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Point Cash Value of Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Table 6. Results for *Fairness of Point Scheme*[1] – Test of H2 and H4

Panel A: ANOVA

Source of variance	**df**	**MS**	**F**	***p*-value**[2]
Between Subjects:				
Point Reward Unpredictability (Fixed vs. Loot)[3]	1	44.11	6.76	0.01**
Cash Value of Point Reward (Absent vs. Present)[4]	1	6.04	0.93	0.34
H4: *Reward Unpredictability*Cash Value of Reward*	1	12.00	1.84	0.18
Error	194	6.52		

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
H2: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	50.52	8.76	<0.01***
Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	5.10	0.70	0.40

[1] *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair.".

[2] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[3] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[4] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Table 7. Results for *Disengagement*[1] – Test of RQ1 and RQ2

Panel A: ANOVA

Source of variance	**df**	**MS**	**F**	***p*-value**[2]
Between Subjects:				
Point Reward Unpredictability (Fixed vs. Loot)[3]	1	0.68	0.16	0.69
Cash Value of Point Reward (Absent vs. Present)[4]	1	2.59	0.59	0.44
*Point Reward Unpredictability*Cash Value of Point Reward*	1	8.08	1.84	0.18
Error	194	4.38		

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
RQ1: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	6.66	1.38	0.24
RQ2: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	2.05	0.52	0.47

[1] *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83).

[2] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[3] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[4] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Table 8. Results for *Performance (Total)*[1] – Test of RQ3 and RQ4

Panel A: Repeated Measures ANCOVA

Source of variance	**df**	**MS**	**F**	***p*-value**[2]
Between Subjects:				
Point Reward Unpredictability (Fixed vs. Loot)[3]	1	1667.79	2.08	0.15
Cash Value of Point Reward (Absent vs. Present)[4]	1	4201.33	5.24	0.02**
*Point Reward Unpredictability*Cash Value of Point Reward*	1	3586.92	4.48	0.04**
Error	193	801.03		
Within Subjects:				
Period[5]	1	30.30	0.42	0.52
Period by *Point Reward Unpredictability*	1	186.96	2.59	0.11
Period by *Cash Value of Point Reward*	1	7.59	0.11	0.75
Period by *Point Reward Unpredictability*Cash Value of Point Reward*	1	179.79	2.49	0.12
Error	194			

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	239.76	0.29	0.59
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	5017.50	6.13	0.01**

[1] *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

[2] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[3] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[4] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[5] The *Period* measure has two levels, corresponding the first and the second performance periods.

Table 9. Results for *Performance (Period 1)*[1] and *Performance (Period 2)*[2]

Panel A: ANCOVA results **Source of variance**	**df**	**MS**	**F**	***p*-value**[3]
DV: Performance (Period 1)				
Point Reward Unpredictability (Fixed vs. Loot)[4]	1	1510.74	4.06	0.05**
Cash Value of Point Reward (Absent vs. Present)[5]	1	2267.31	6.10	0.01**
*Point Reward Unpredictability*Cash Value of Point Reward*	1	975.70	2.62	0.11
Error	193	371.93		
DV: Performance (Period 2)				
Point Reward Unpredictability (Fixed vs. Loot)	1	356.69	0.71	0.40
Cash Value of Point Reward (Absent vs. Present)	1	1940.38	3.88	0.05*
*Point Reward Unpredictability*Cash Value of Point Reward*	1	2858.22	5.72	0.02**
Error	193	500.05		
Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
Performance (Period 1)				
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	369.62	0.59	0.44
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	4481.42	8.03	<0.01***
Performance (Period 2)				
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	2131.05	2.85	0.09*
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	4445.87	7.49	<0.01***

[1] *Performance (Period 1)* is the number of decoding questions completed in the first performance period.
[2] *Performance (Period 2)* is the number of decoding questions completed in the second performance period.
[3] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.
[4] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.
[5] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Table 10. Multiple Group Path Analysis Results – Test of H1 and H2

Panel A: Model Comparison

Fit Indices	χ^2 (p-value)	CFI	TLI	RMSEA	SRMR
Unconstrained Model[1]	20.87 (0.19)	0.97	0.95	0.04	0.07
Fully Constrained Model[2]	32.28 (0.04**)	0.93	0.90	0.05	0.10
$\Delta\chi^2$ *(7)* *(p-value)*	11.41 (0.12)				

[1] Unconstrained Model refers to the model depicted in Figure 8.

[2] Fully Constrained Model refers to the model depicted in Figure 8, with all paths being constrained equal between the *Cash Value of Point Reward* (Absent) and *Cash Value of Point Reward* (Present) groups.

Table 10. (Continued) Multiple Group Path Analysis Results – Test of H1 and2

Panel B: Path Analysis Structural Paths:	Standardized Coefficients	Standard Error	*p*-value[3]
Cash Value of Point Reward (Absent)[4], N=98			
H1: *Point Reward Unpredictability[5]* ➔ *Task Attractiveness[6]*	0.19	0.49	0.06*
H2: *Point Reward Unpredictability* ➔ *Fairness of Point Scheme[7]*	-0.29	0.48	<0.01***
Task Attractiveness ➔ *Disengagement[8]*	-0.52	0.08	<0.01***
Fairness of Point Scheme ➔ *Disengagement*	-0.15	0.08	0.07*
Disengagement ➔ *Performance (Total)[9]*	-0.19	1.84	0.01**
Point Reward Unpredictability ➔ *Performance (Total)*	-0.05	8.00	0.42
Cash Value of Point Reward (Present), N=100			
Point Reward Unpredictability ➔ *Task Attractiveness*	-0.05	0.48	0.65
Point Reward Unpredictability ➔ *Fairness of Point Scheme*	-0.08	0.54	0.40
Task Attractiveness ➔ *Disengagement*	-0.60	0.07	<0.01***
Fairness of Point Scheme ➔ *Disengagement*	0.07	0.06	0.40
Disengagement ➔ *Performance (Total)*	-0.13	1.92	0.11
Point Reward Unpredictability ➔ *Performance (Total)*	0.23	7.63	<0.01***

[3] * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[4] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[5] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[6] *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?"

[7] *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair."

[8] *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83).

[9] *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

Table 11. Comparison of Mean *Performance (Total)*[1] Between Different Financial Risk Attitude Groups[2] in *Cash Value of Point Reward (Present)*[3] Conditions (N=100)

Financial Risk Attitude Group	Point Reward Unpredictability (Fixed)[4]	Point Reward Unpredictability (Loot)	t	*p*-value [5]
Risk Averse (N=79)	292.23 (N=37)	320.12 (N=42)	-3.44	<0.01***
Risk Neutral (N=15)	324.03 (N=10)	337.84 (N=5)	-0.49	0.63
Risk Seeking (N=6)	299.82 (N=4)	280.41 (N=2)	2.17	0.10*
Average Financial Risk Attitude	1.35 (N=51)	1.18 (N=49)	1.51	0.13

[1] *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

[2] Risk Averse Group = 1, Risk Neutral Group = 2 and Risk Seeking Group = 3. The grouping is based on the value of *Financial Risk Attitude*, measured by a scale from Dohmen et al. (2011). The scale contains 19 questions of two options between a fixed amount of monetary gain from $10 to $200 at $10 intervals, and a lottery that has an expected gain of $150. For each question, participants choose from the two options. The value of this variable is 15 for risk neutral participants, from 1 to 14 for risk averse participants and from 16 to 19 for risk seeking participants.

[3] In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[4] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[5] * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

Table 12. Results for *Performance (Total)*[1]*- Ability*[2] excluded

Panel A: Repeated Measures ANOVA

Source of variance	**df**	**MS**	**F**	***p*-value**[3]
Between Subjects:				
Point Reward Unpredictability (Fixed vs. Loot)[4]	1	1127.71	0.95	0.33
Cash Value of Point Reward (Absent vs. Present)[5]	1	4690.01	3.94	0.05**
H4: *Point Reward Unpredictability*Cash Value of Point Reward*	1	9864.49	8.29	<0.01***
Error	194	1189.36		
Within Subjects:				
Period[6]	1	30.30	0.42	0.52
Period by *Point Reward Unpredictability*	1	186.96	2.59	0.11
Period by *Cash Value of Point Reward*	1	7.59	0.11	0.75
Period by *Point Reward Unpredictability*Cash Value of Point Reward*	1	179.79	2.49	0.12
Error	194			

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	2327.5	1.93	0.17
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	8747.88	7.25	0.01**

[1] *Performance (Total)* is measured by the number of decoding questions completed in both performance periods.

[2] *Ability* is measured by the number of decoding questions completed in the 2-minute practice period.

[3] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[4] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[5] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[6] The *Period* measure has two levels, corresponding the first and the second performance periods.

Table 13. Results for *Performance (Period 1)*[1] and *Performance (Period 2)*[2] - *Ability*[3] excluded

Panel A: ANOVA results

Source of variance	**df**	**MS**	**F**	***p*-value**[4]
DV: Performance (Period 1)				
Point Reward Unpredictability (Fixed vs. Loot)[5]	1	1116.51	1.89	0.17
Cash Value of Point Reward (Absent vs. Present)[6]	1	2537.42	4.29	0.04**
*Point Reward Unpredictability*Cash Value of Point Reward*	1	3690.39	6.23	0.01**
Error	194	591.92		
DV: Performance (Period 2)				
Point Reward Unpredictability (Fixed vs. Loot)	1	198.17	0.30	0.59
Cash Value of Point Reward (Absent vs. Present)	1	2160.18	3.23	0.07**
*Point Reward Unpredictability*Cash Value of Point Reward*	1	6353.90	9.49	<0.01***
Error	194	669.61		

Panel B: Follow-up Planned Contrast	**df**	**MS**	**F**	***p*-value**
Performance (Period 1)				
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	369.62	0.59	0.22
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	4481.42	8.03	<0.01***
Performance (Period 2)				
RQ3: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is absent	1	2131.05	2.85	0.05**
RQ4: Effect of *Point Reward Unpredictability* when *Cash Value of Point Reward* is present	1	4445.87	7.49	<0.01***

[1] *Performance (Period 1)* is the number of decoding questions completed in the first performance period.

[2] *Performance (Period 2)* is the number of decoding questions completed in the second performance period.

[3] *Ability* is measured by the number of decoding questions completed in the 2-minute practice period.

[4] N = 198; * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[5] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[6] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

Table 14. Multiple Group Path Analysis Results – Test of H1 and H2 (*Ability*[1] excluded*)*

Panel A: Model Comparison

Fit Indices	χ^2 (p-value)	CFI	TLI	RMSEA	SRMR
Unconstrained Model[2]	6.00 (0.65)	1.00	1.05	0.00	0.04
Fully Constrained Model[3]	32.28 (0.04**)	0.93	0.90	0.05	0.10
$\Delta\chi^2$ *(15)* *(p-value)*	26.28 (0.04**)				

[1] *Ability* is measured by the number of decoding questions completed in the 2-minute practice period.

[2] Unconstrained Model refers to the model depicted in Figure 8, excluding *Ability.*

[3] Fully Constrained Model refers to the model depicted in Figure 8, excluding *Ability*, with all paths being constrained equal between the *Cash Value of Point Reward* (Absent) and *Cash Value of Point Reward* (Present) groups.

Table 14. (Continued) Multiple Group Path Analysis Results – Test of H1 and H2 (*Ability* excluded*)*

Panel B: Path Analysis Structural Paths:	Standardized Coefficients	Standard Error	*p*-value[4]
Cash Value of Point Reward (Absent)[5], N=98			
H1: *Point Reward Unpredictability[6]* ➔ *Task Attractiveness[7]*	0.19	0.49	0.06*
H2: *Point Reward Unpredictability* ➔ *Fairness of Point Scheme[8]*	-0.29	0.48	<0.01***
Task Attractiveness ➔ *Disengagement[9]*	-0.52	0.08	<0.01***
Fairness of Point Scheme ➔ *Disengagement*	-0.15	0.08	0.07*
Disengagement ➔ *Performance (Total)[10]*	-0.24	2.29	0.01**
Point Reward Unpredictability ➔ *Performance (Total)*	-0.16	9.96	0.10
Cash Value of Point Reward (Present), N=100			
Point Reward Unpredictability ➔ *Task Attractiveness*	-0.05	0.48	0.65
Point Reward Unpredictability ➔ *Fairness of Point Scheme*	-0.08	0.54	0.40
Task Attractiveness ➔ *Disengagement*	-0.60	0.07	<0.01***
Fairness of Point Scheme ➔ *Disengagement*	0.07	0.06	0.40
Disengagement ➔ *Performance (Total)*	-0.11	2.32	0.24
Point Reward Unpredictability ➔ *Performance (Total)*	0.29	9.19	<0.01***

[4] * p<.10; ** p< .05; *** p< .01. All significance values are two-tailed at 95% confidence level.

[5] In the *Cash Value of Point Reward (Absent)* conditions, point rewards do not carry any monetary value. In the *Cash Value of Point Reward (Present)* conditions, participants gain 0.05 Canadian dollars for every 10 points earned.

[6] In the *Point Reward Unpredictability (Fixed)* conditions, participants receive 5 points for every 10 decoding questions completed. In the *Point Reward Unpredictability (Loot)* conditions, participants receive either 0 or 10 points at a 50/50 chance for every 10 decoding questions completed.

[7] *Task Attractiveness* is the average of three 11-point Likert scale questions adapted from Fessler (2003): "Please share with us your thoughts on the decoding task (game) you just tried: 1) Was it attractive or repulsive? 2) Was it exciting or dull? 3) Was it fun or tedious?"

[8] *Fairness of Point Scheme* is one 11-point Likert scale question: "I think the point rewards scheme is fair."

[9] *Disengagement* is the average of three 11-point Likert scale questions adapted from Fahlman et al. 2013): 1) "I seemed to be forced to do things that had no value to me."; 2) "I wanted to do something fun, but nothing appealed to me."; and 3) "I wish I were doing something more exciting." (Cronbach's α=0.83).

[10] *Performance (Total)* is the number of decoding questions completed in both performance periods.

APPENDICES

Appendix 1. Boredom Proneness Scale

(Struk et al. 2017)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

1. I often find myself at “loose ends,” not knowing what to do.
2. I find it hard to entertain myself.
3. Many things I have to do are repetitive and monotonous.
4. It takes more stimulation to get me going than most people.
5. I don't feel motivated by most things that I do.
6. In most situations, it is hard for me to find something to do or see to keep me interested.
7. Much of the time, I just sit around doing nothing.
8. Unless I am doing something exciting, even dangerous, I feel half-dead and dull.

Appendix 2. Risk Attitude Scales

I. Financial Risk Attitude (Dohmen et al. 2011)

Imagine that you need to make the following financial decision. Which one do you prefer?

a. To receive $10 ($20, $30, $40….$200)
b. To play a lottery of receiving $0 or $300 at a 50/50 chance.

II. Recreational Risk Attitude (Weber et al. 2002)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

1. Chasing a tornado or hurricane by car to take dramatic photos.
2. Going camping in the wilderness, beyond the civilization of a campground.
3. Going on a vacation in a third-world country without prearranged travel and hotel accommodations.
4. Going down a ski run that is beyond your ability.
5. Going whitewater rafting during rapid water flows in the spring.
6. Periodically engaging in a dangerous sport (e.g., mountain climbing or sky diving).
7. Trying out bungee jumping at least once.
8. Piloting your own small plane, if you could.

III. Gambling Risk Attitude (Weber et al. 2002)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

1. Betting a day’s income at the horse race.
2. Betting a day’s income at a high stake poker game.
3. Betting a day’s income on the outcome of a sporting event (e.g., baseball, soccer, or football).
4. Gambling a week’s income at a casino.

Appendix 3. Uncertainty Avoidance Scale

(Jung and Kellaris, 2004)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

1. I prefer structured situations to unstructured situations.
2. I prefer specific instructions to broad guidelines.
3. I tend to get anxious easily when I don’t know an outcome.
4. I feel stressed when I cannot predict consequences.
5. I would not take risks when an outcome cannot be predicted.
6. I believe that rules should not be broken for mere pragmatic reasons.
7. I don’t like ambiguous situations.

Appendix 4. Dispositional Optimism Scale

(Scheier and Carver 1985)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax. (Filler item)
3. If something can go wrong for me, it will. (Reverse coded)
4. I always look on the bright side of things.
5. I'm always optimistic about my future.
6. It's important for me to keep busy. (Filler item)
7. I hardly ever expect things to go my way. (Reverse coded)
8. Things never work out the way I want them to. (Reverse coded)
9. I'm a believer in the idea that "every cloud has a silver lining".
10. I don't get upset too easily. (Filler item)
11. I rarely count on good things happening to me. (Reverse coded)
12. I enjoy my friends a lot. (Filler item)

Appendix 5. Positive and Negative Affects Schedule - PANAS

(Adapted from Watson et al. 1988)

Participants answer the following questions along 11-point Likert scales (1="strongly disagree"; 11="strongly agree"). The average score is used for analyses.

Fixed Point Rewards Conditions:

1. I felt determined in the decoding task.
2. I felt interested in the decoding task.
3. I felt excited about earning points in the decoding task.
4. I felt upset while performing in the decoding task.
5. I felt irritable while performing in the decoding task.
6. I felt nervous while checking out my points in the decoding task.

Loot Point Rewards Conditions:

1. I felt determined in the decoding game.
2. I felt interested in the decoding game.
3. I felt excited about earning points in the decoding game.
4. I felt upset while performing in the decoding game.
5. I felt irritable while performing in the decoding game.
6. I felt nervous while checking out my points in the decoding game.

Appendix 6. Comprehension Check Questions

1. How many points will I receive for completing 10 decodes?
   a. I receive 10 points.
   b. I receive 5 points.
   c. I receive 5 points at a 50% chance.
   d. I receive 10 points at a 50% chance.

2. I will complete as many decoding questions as possible in TWO _____ minutes periods in a row.
   a. 20 minutes
   b. 40 minutes

3. After each 10 decodes I will receive the performance feedback. How much time do I have to review it?
   a. 5 seconds
   b. 8 seconds

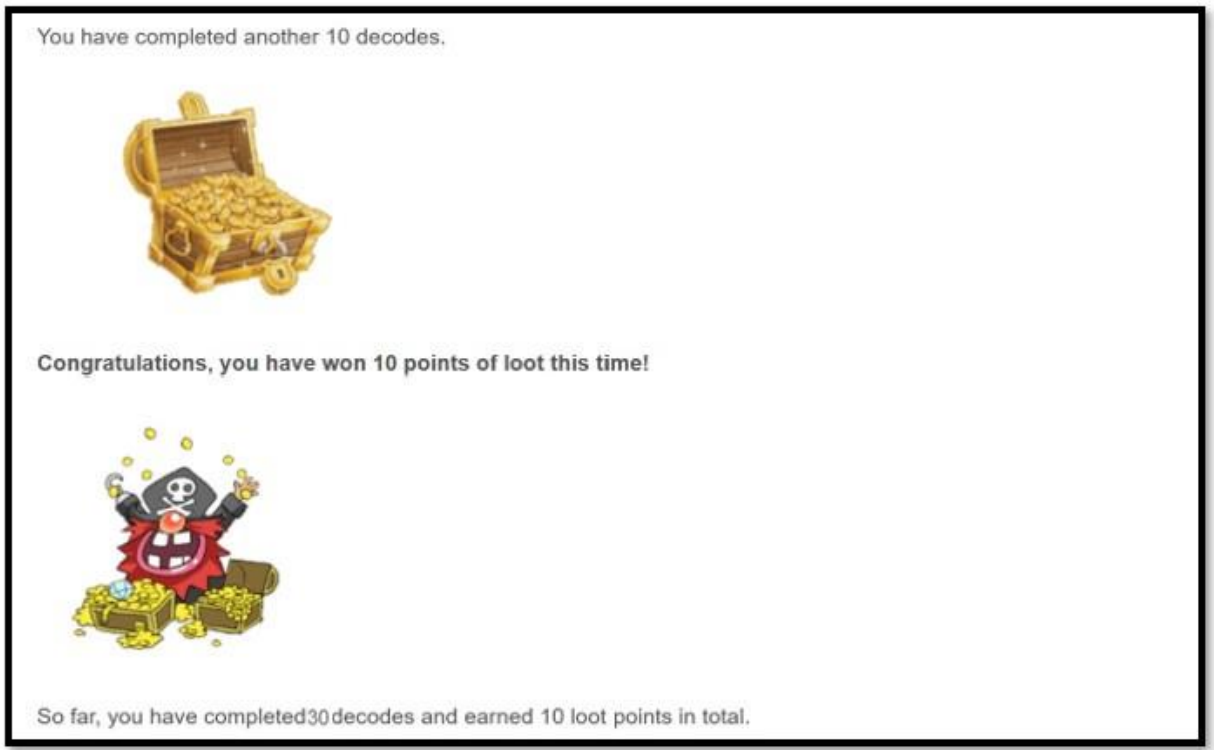
4. (Only for conditions where point rewards have cash value) I receive $_____ for every 10 points earned.
   a. 0.05
   b. 0.01

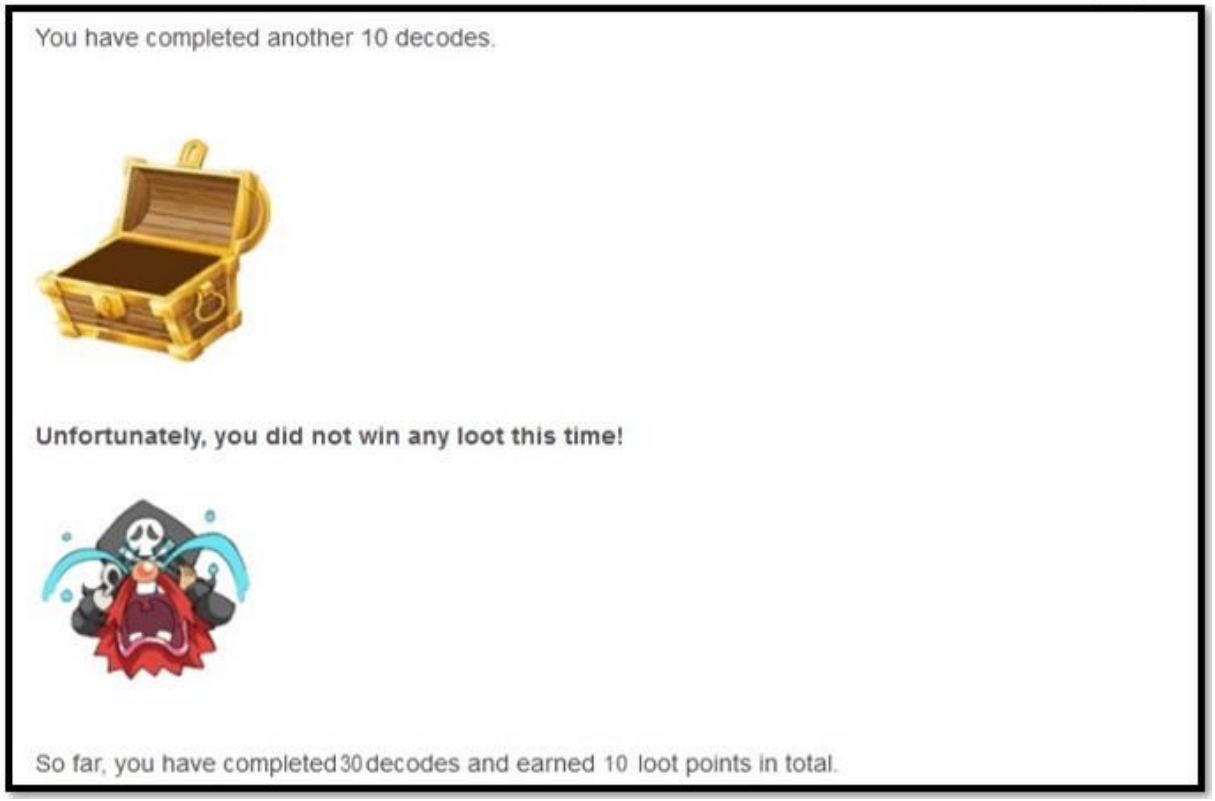
Appendix 7. Background Questions

1. What is your gender?
2. What is your age?
3. What is your academic level?
4. What is your academic program?
5. What is your academic year?
6. How many months of work experience do you have? Please convert your part-time work experience to full-time experience (35-40 hours weekly).
7. What is your estimated GPA as of 2020 Spring/Summer (out of 12 points)

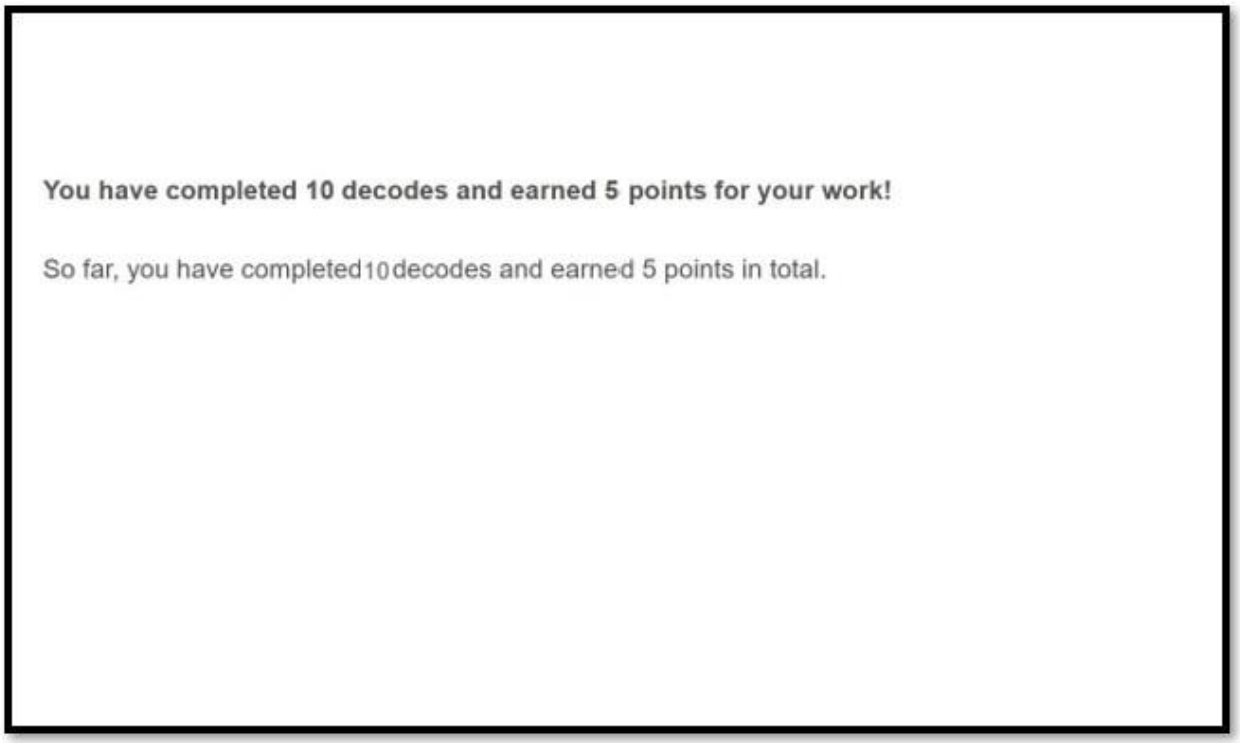
Appendix 8. Examples of Point Reward Screens

Loot Point Rewards Conditions:

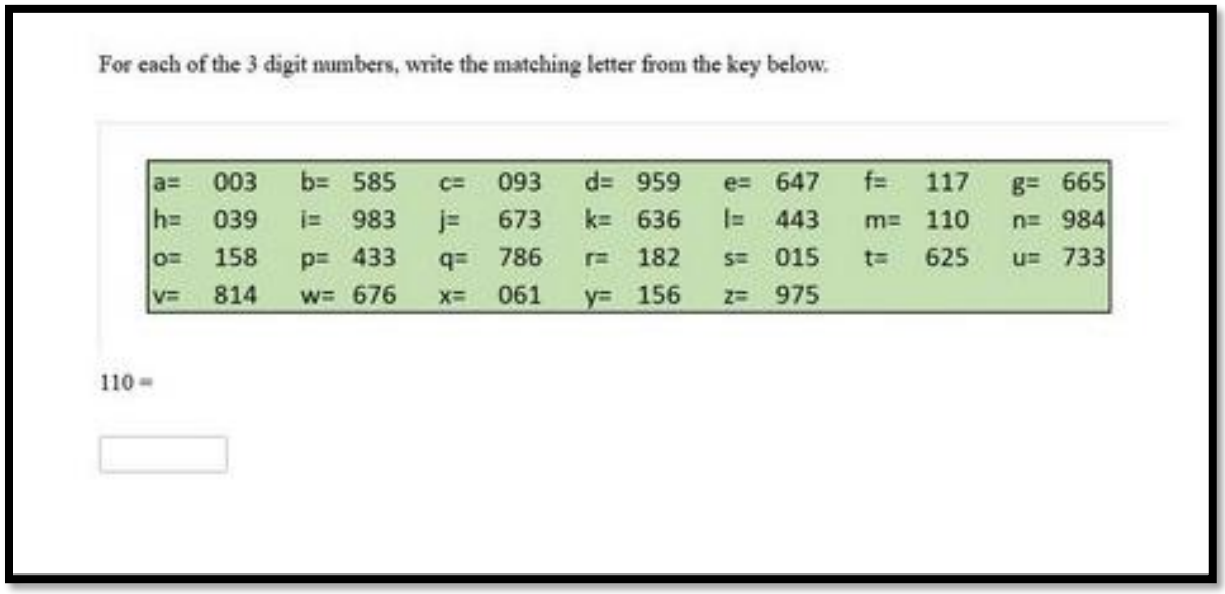




Fixed Point Rewards Conditions:



Appendix 9. Example of Decoding Questions



For each of the 3 digit numbers, write the matching letter from the key below.

a=	003	b=	585	c=	093	d=	959	e=	647	f=	117	g=	665
h=	039	i=	983	j=	673	k=	636	l=	443	m=	110	n=	984
o=	158	p=	433	q=	786	r=	182	s=	015	t=	625	u=	733
v=	814	w=	676	x=	061	y=	156	z=	975				

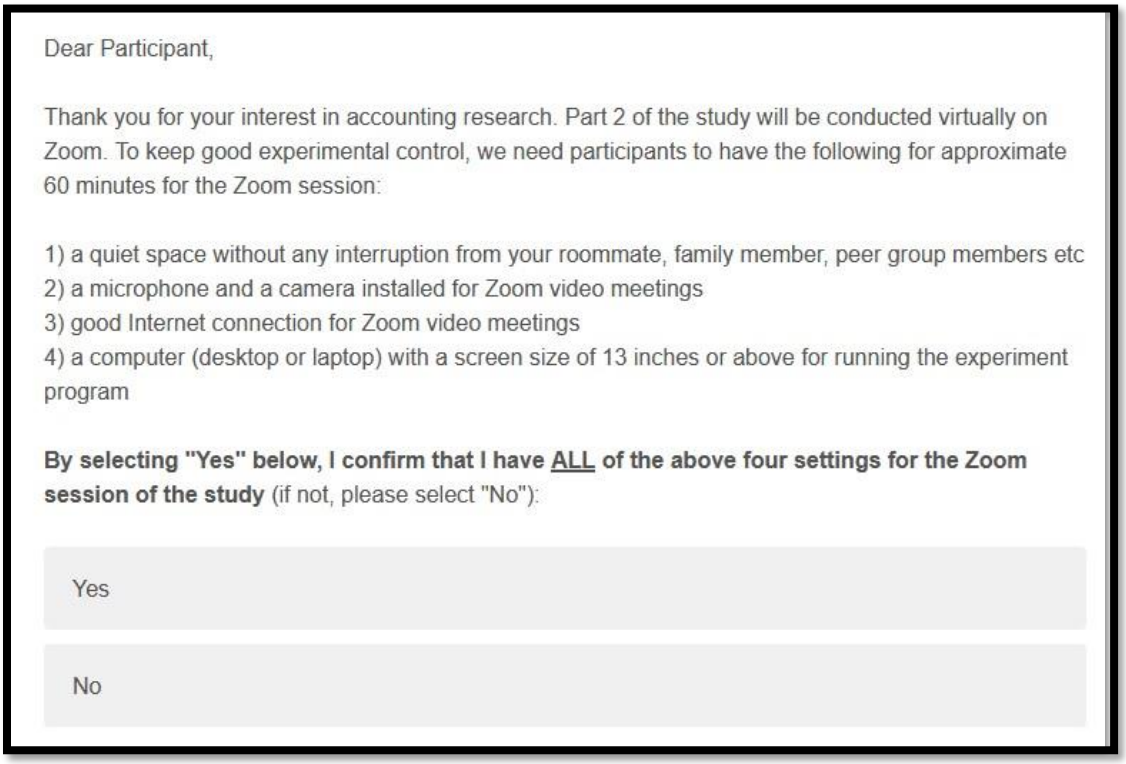
110 =

Appendix 10. Screenshots of Research Instrument (For All Conditions Unless Specified)

Online Survey

Device Requirements

Screen 1



Dear Participant,

Thank you for your interest in accounting research. Part 2 of the study will be conducted virtually on Zoom. To keep good experimental control, we need participants to have the following for approximate 60 minutes for the Zoom session:

1) a quiet space without any interruption from your roommate, family member, peer group members etc
2) a microphone and a camera installed for Zoom video meetings
3) good Internet connection for Zoom video meetings
4) a computer (desktop or laptop) with a screen size of 13 inches or above for running the experiment program

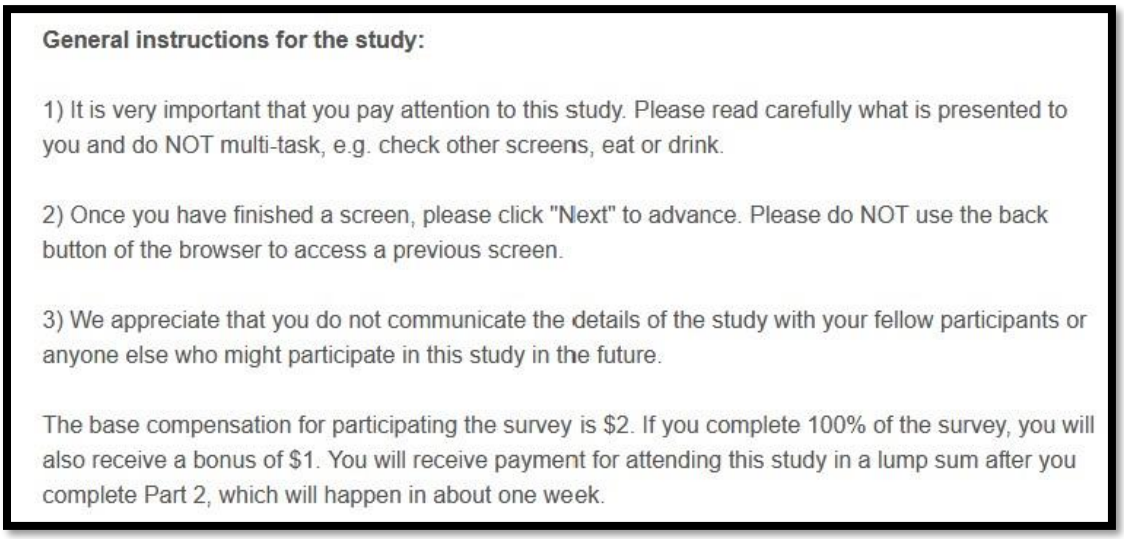
By selecting "Yes" below, I confirm that I have ALL of the above four settings for the Zoom session of the study (if not, please select "No"):

Yes

No

General Instructions

Screen 2



General instructions for the study:

1) It is very important that you pay attention to this study. Please read carefully what is presented to you and do NOT multi-task, e.g. check other screens, eat or drink.

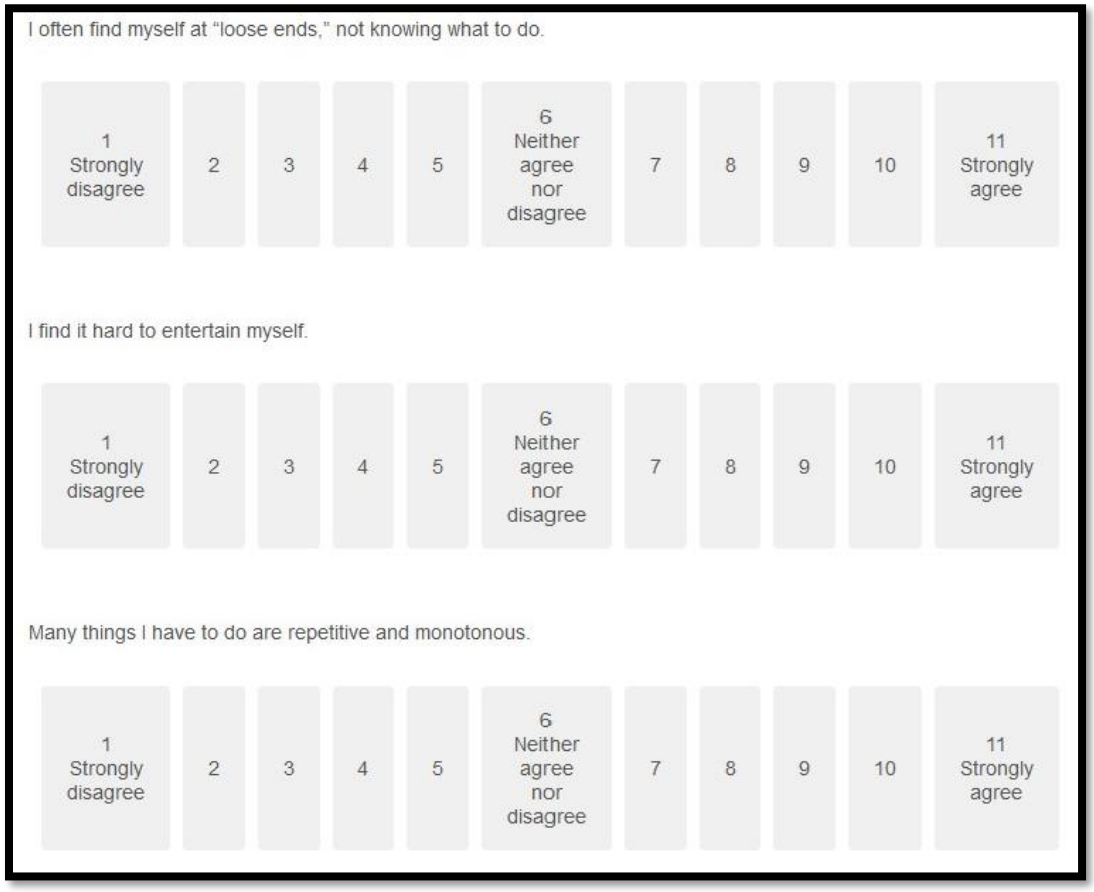
2) Once you have finished a screen, please click "Next" to advance. Please do NOT use the back button of the browser to access a previous screen.

3) We appreciate that you do not communicate the details of the study with your fellow participants or anyone else who might participate in this study in the future.

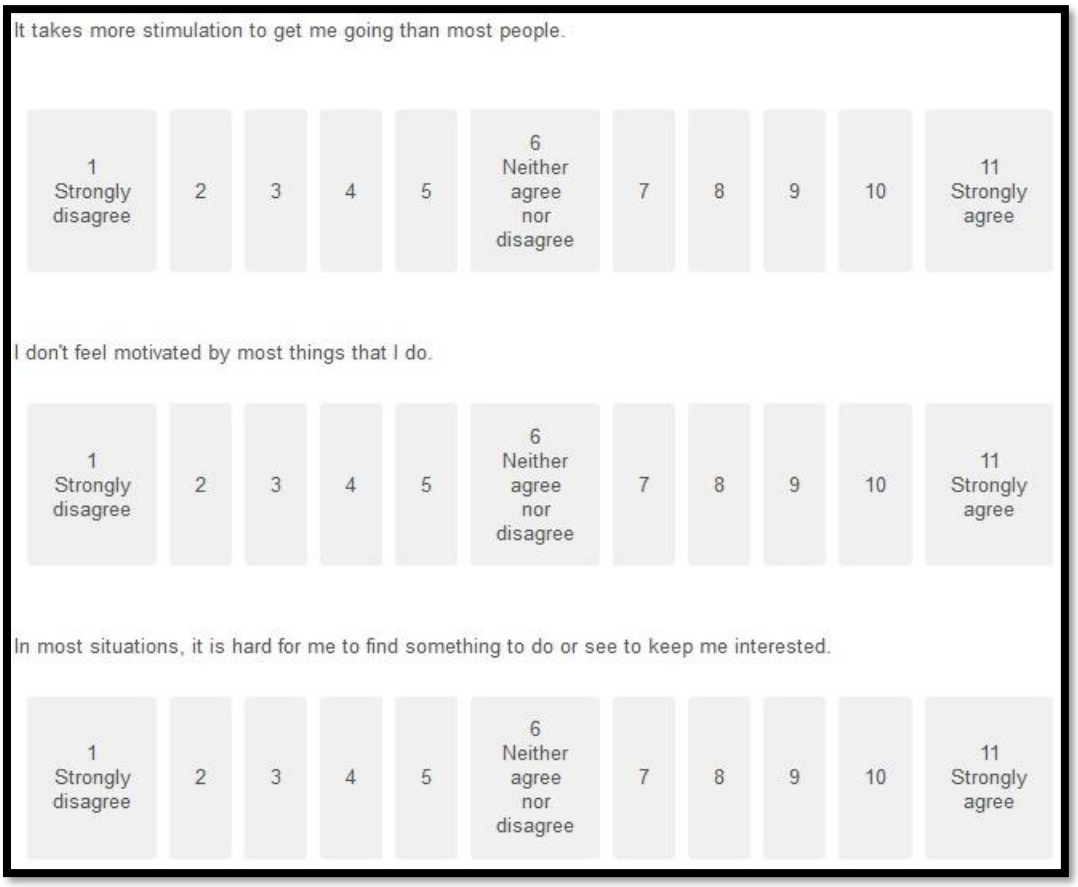
The base compensation for participating the survey is $2. If you complete 100% of the survey, you will also receive a bonus of $1. You will receive payment for attending this study in a lump sum after you complete Part 2, which will happen in about one week.

Individual Differences Measures

Screen 3

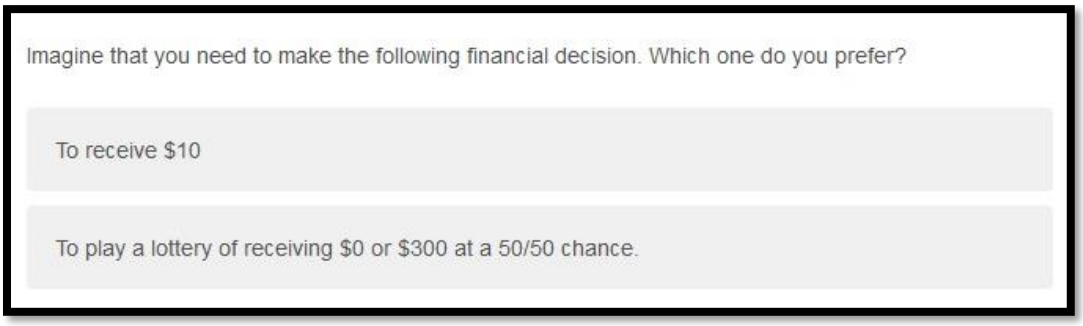


Screen 4

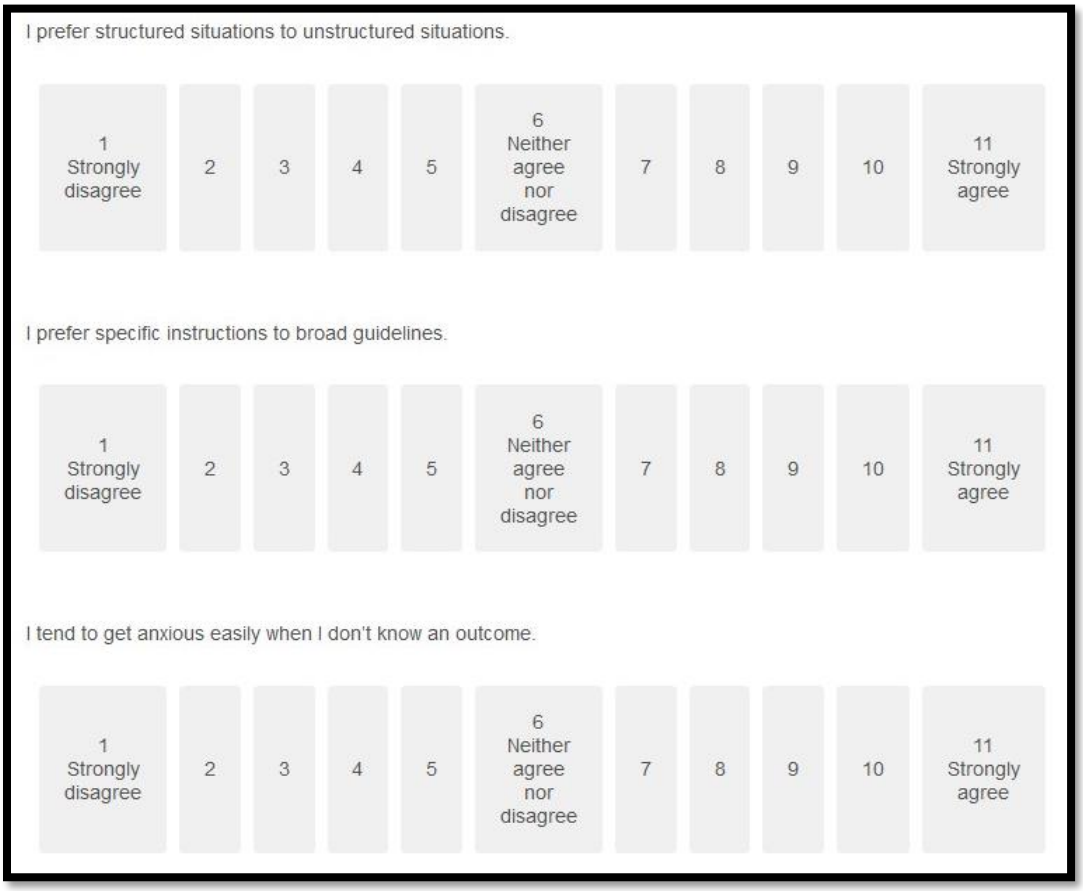


Screen 5

Screen 6

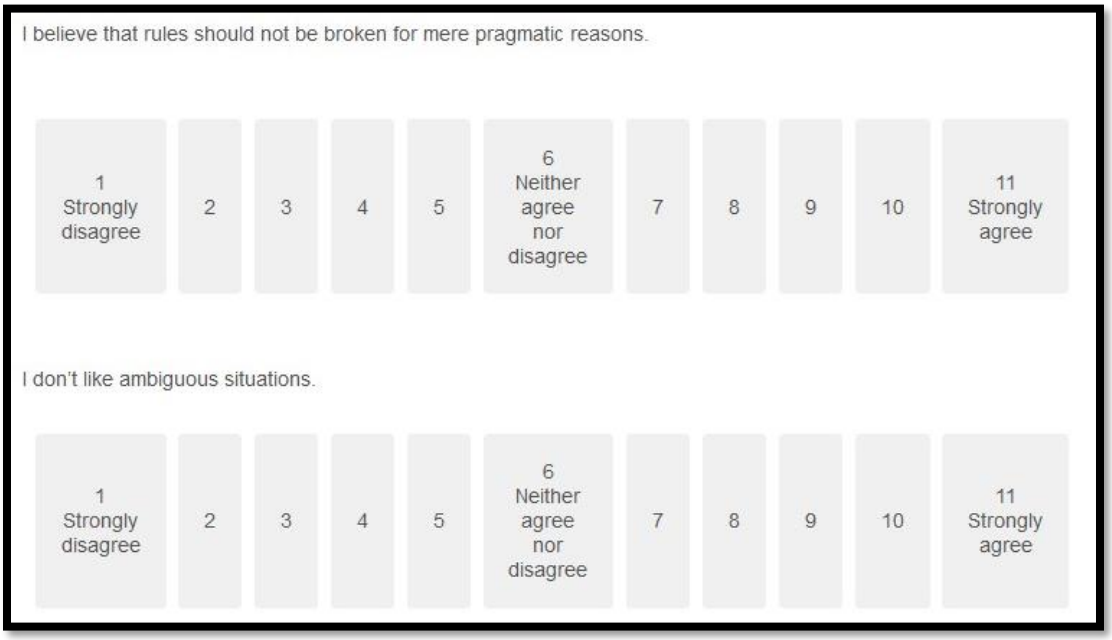


Screen 7

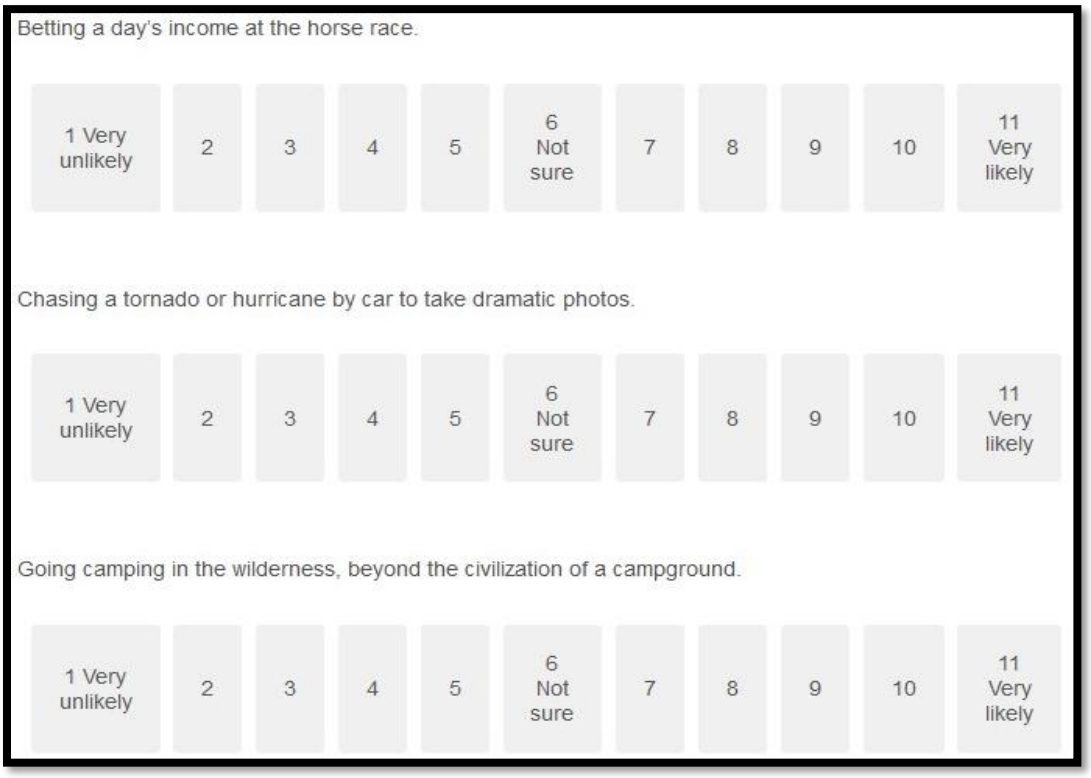


Screen 8

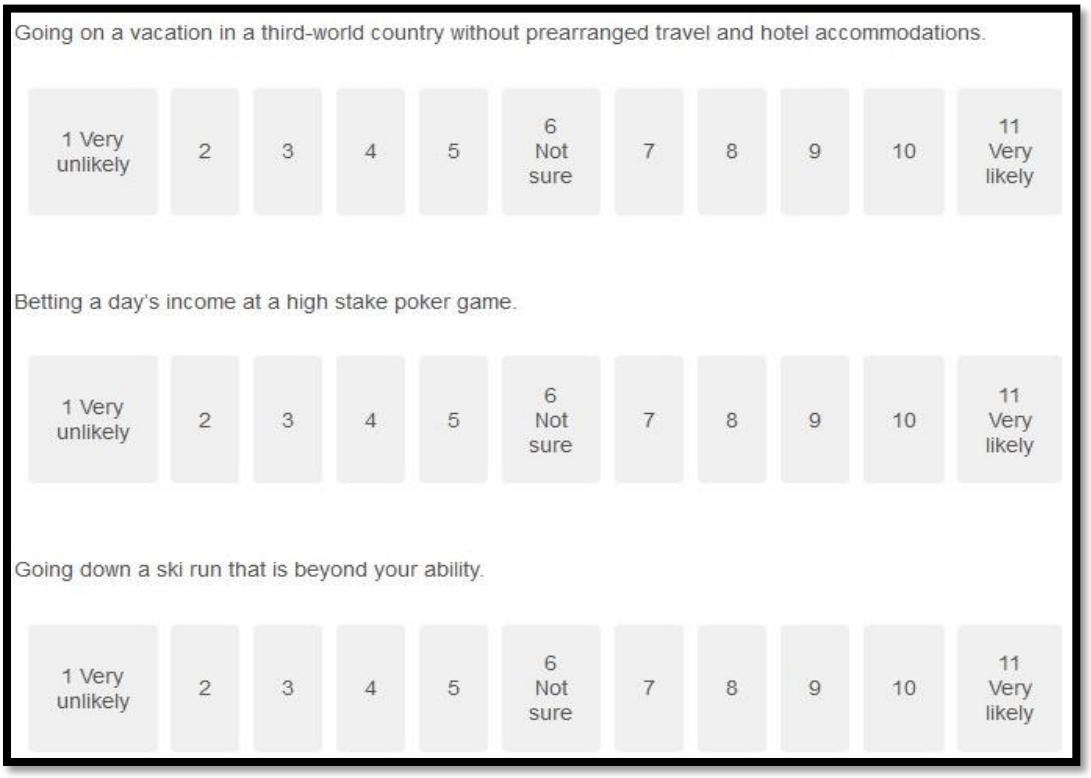
Screen 9



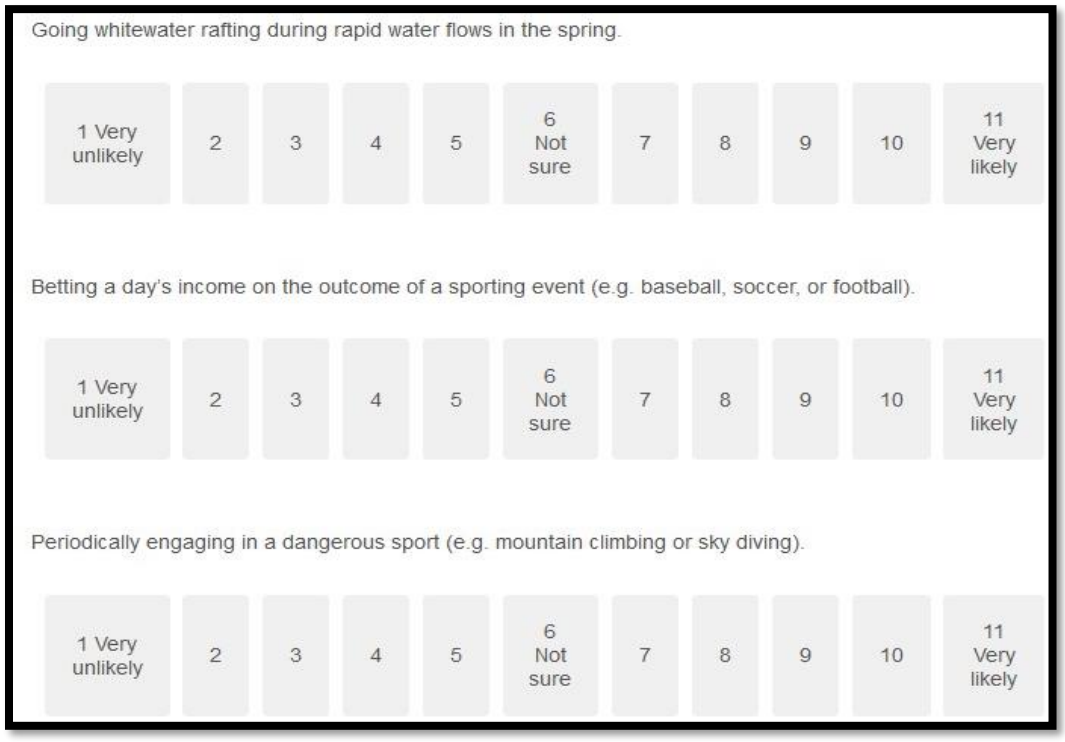
Screen 10



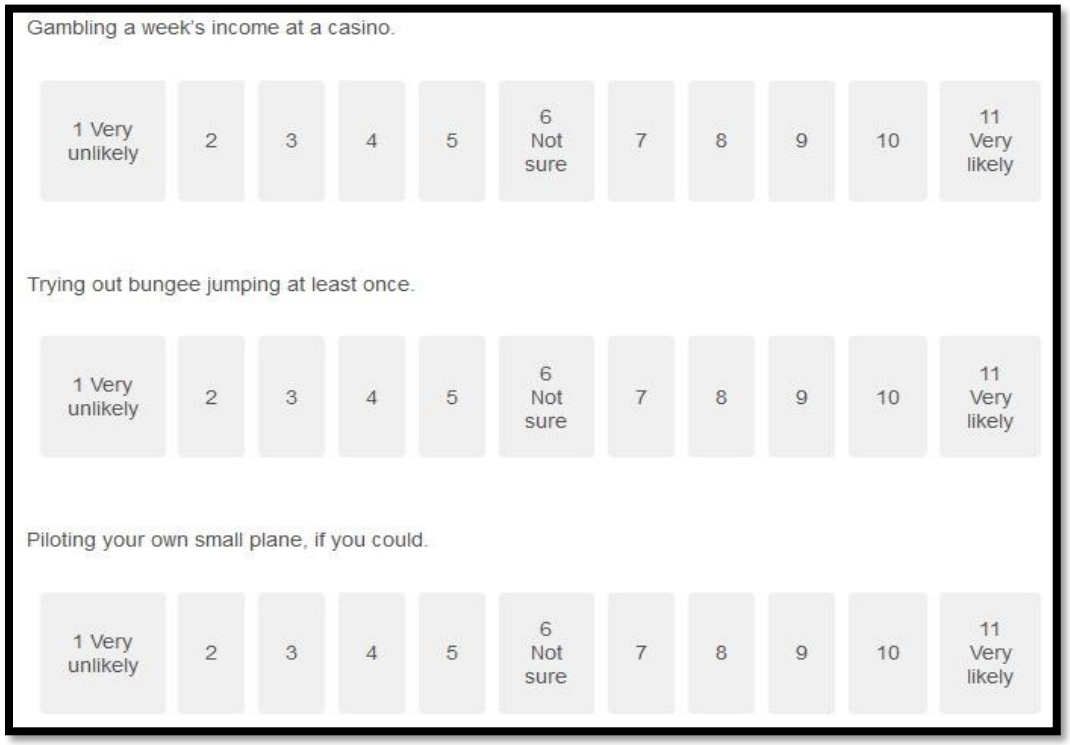
Screen 11



Screen 12



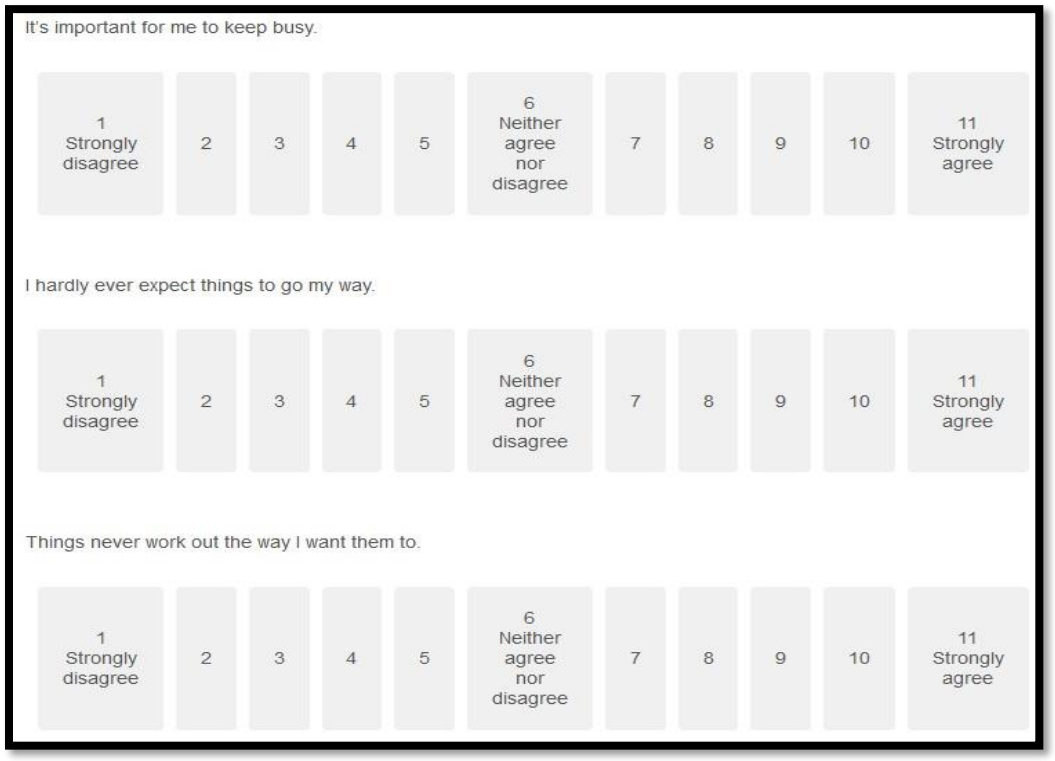
Screen 13



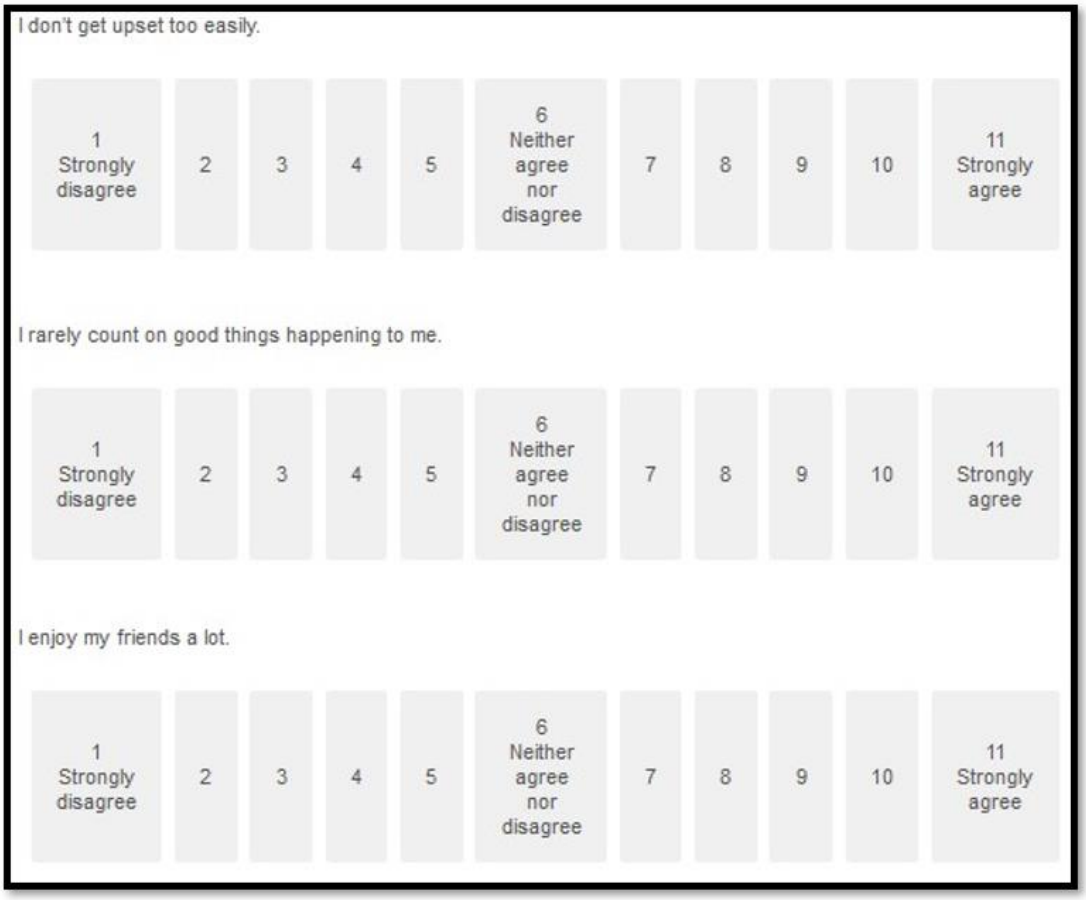
Screen 14

Screen 15

Screen 16


It's important for me to keep busy.
1 Strongly disagree
2
3
4
5
6 Neither agree nor disagree
7
8
9
10
11 Strongly agree
I hardly ever expect things to go my way.
1 Strongly disagree
2
3
4
5
6 Neither agree nor disagree
7
8
9
10
11 Strongly agree
Things never work out the way I want them to.
1 Strongly disagree
2
3
4
5
6 Neither agree nor disagree
7
8
9
10
11 Strongly agree

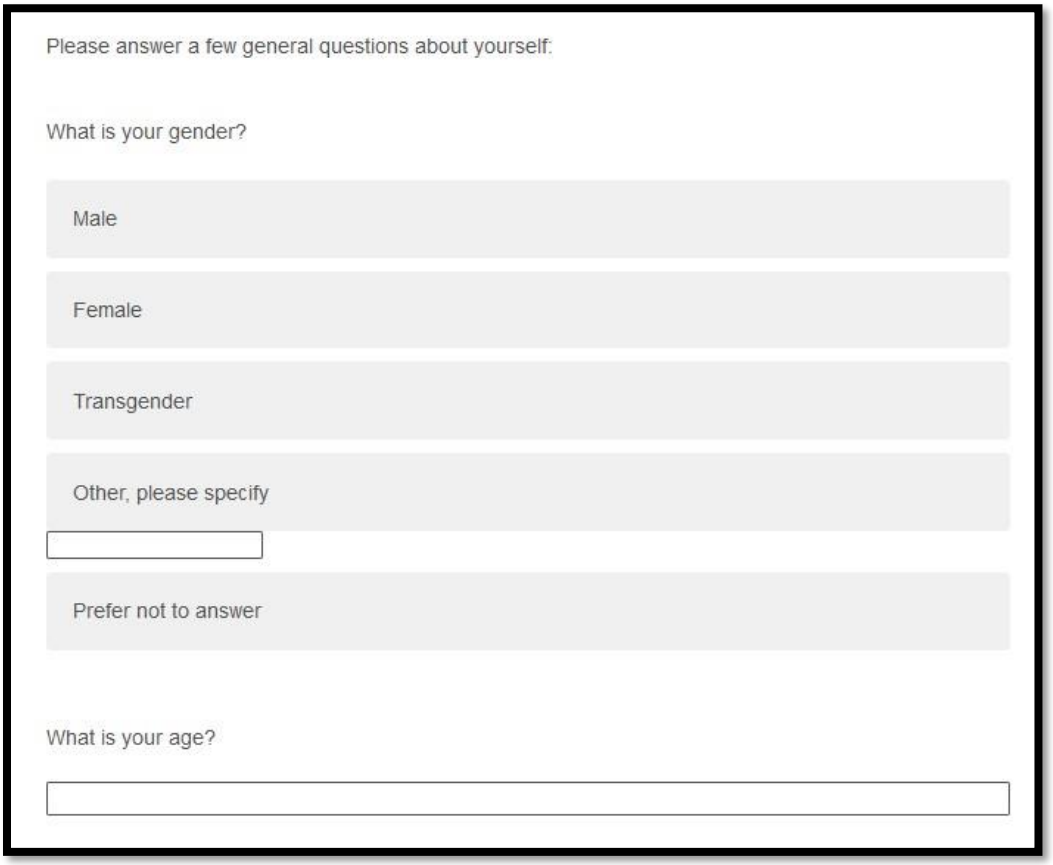
Screen 17



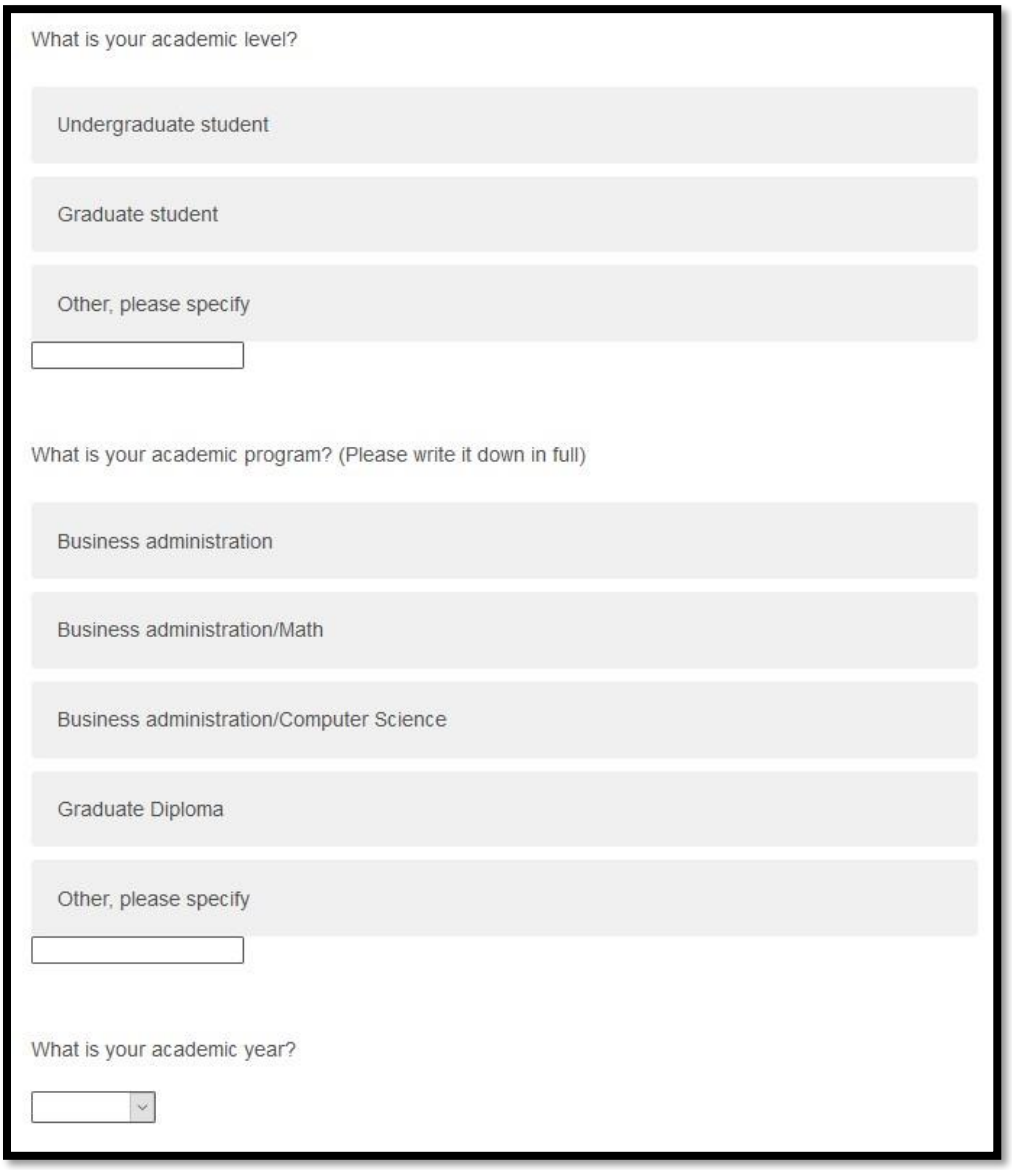
Screen 18

Demographic Questions

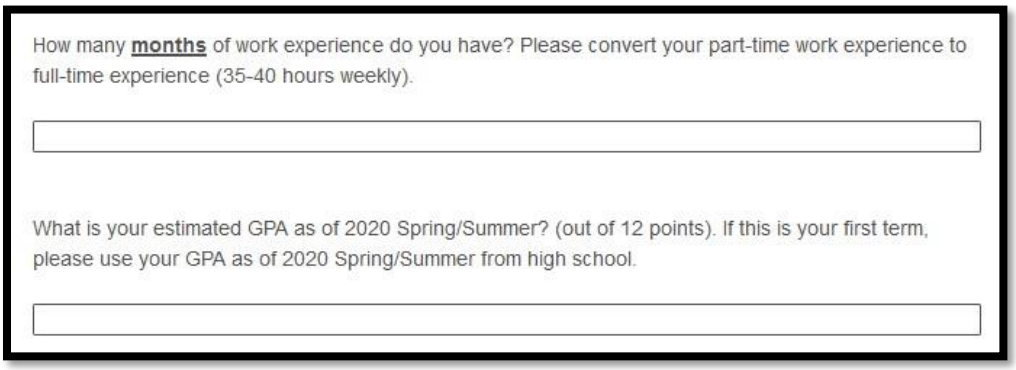
Screen 19



Screen 20



Screen 21



Zoom Session

General Instructions

Screen 1

General Instructions

Thank you for choosing to participate in our study. Please read and follow all instructions carefully **so that the program records your participation of the study successfully**:

1. Your familiarity with the instructions may influence your performance or compensation. Thus, it's very important that you read all instructions carefully. We ask you to please maintain focus and do NOT multi-task during the study time (e.g. eat, drink, check phone/tablet).

2. We appreciate that you do not communicate details of the study with your fellow participants or anyone else who might participate in this study in the future.

3. Please do NOT use the back button of the browser to try to return to a previous screen. That will trigger a restart of the study and all your work will be lost. Once you have finished a screen, please click "Next" to advance.

Task Instructions

Screen 2

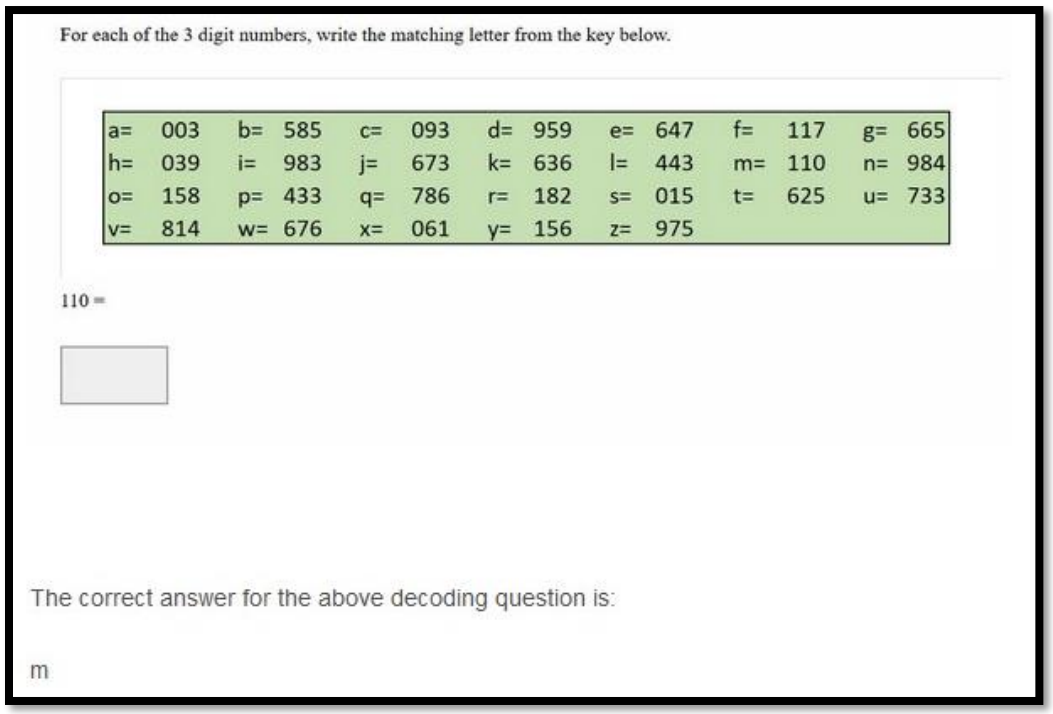
Fixed Point Rewards Conditions:

Imagine you work for an organization where the main part of your job is a decoding task. Decoding involves translating numbers into letters using a decoding key. An example is shown below:

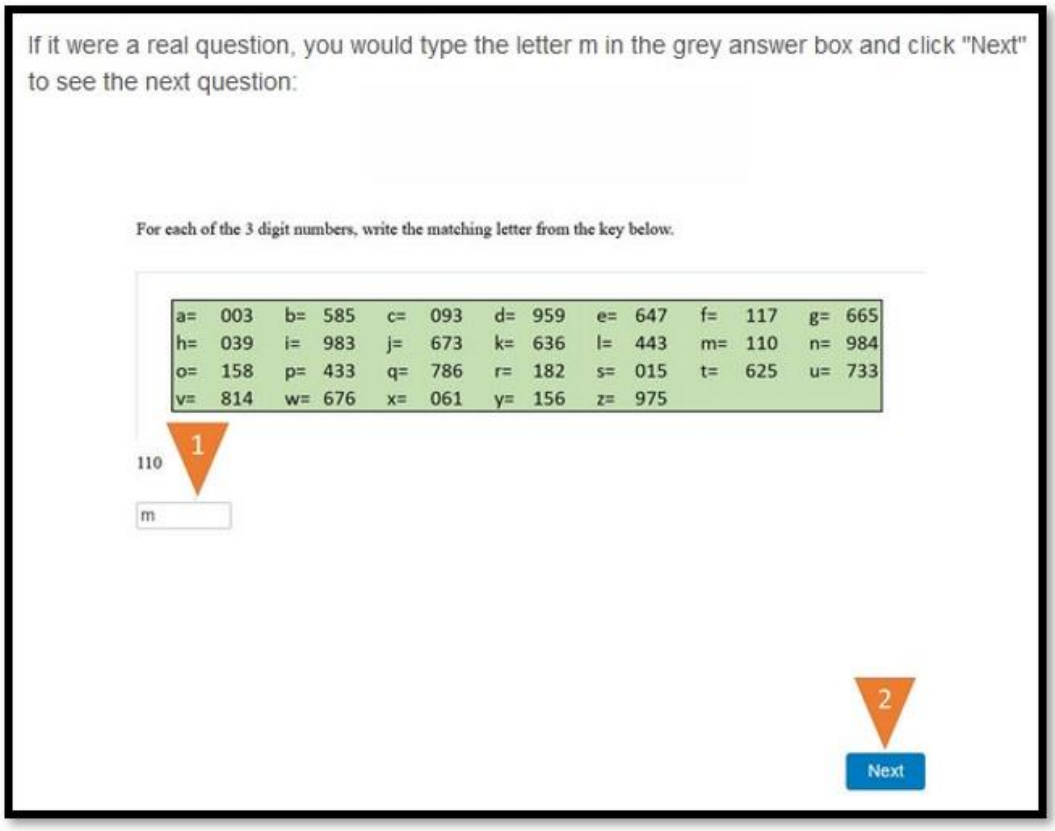
Loot Point Rewards Conditions:

Imagine you work for an organization where the main part of your job is a decoding game. Decoding involves translating numbers into letters using a decoding key. An example is shown below:

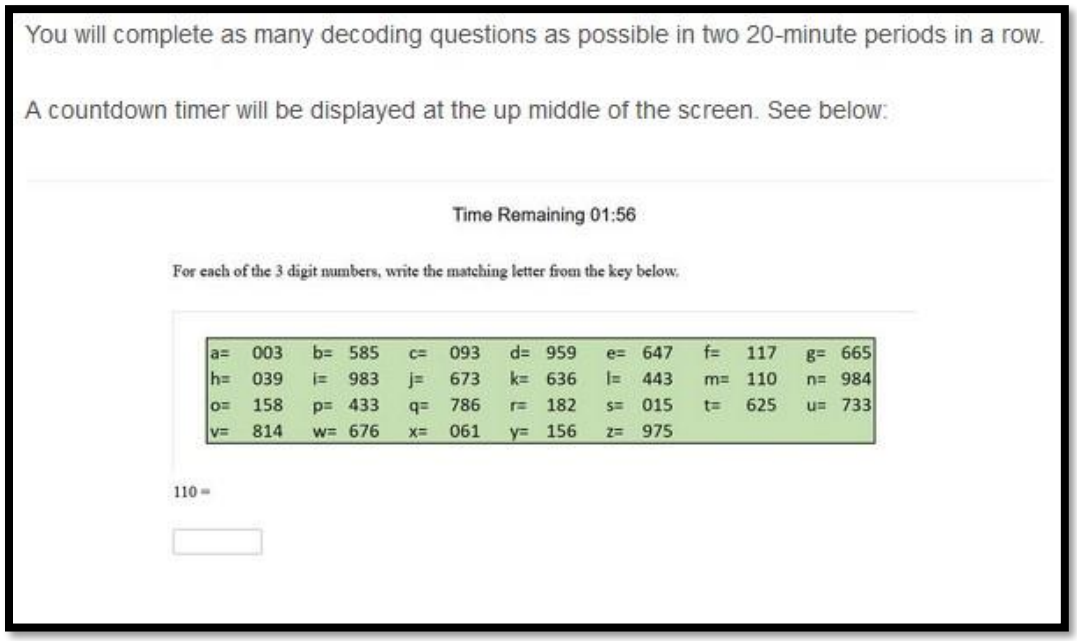
All Conditions:



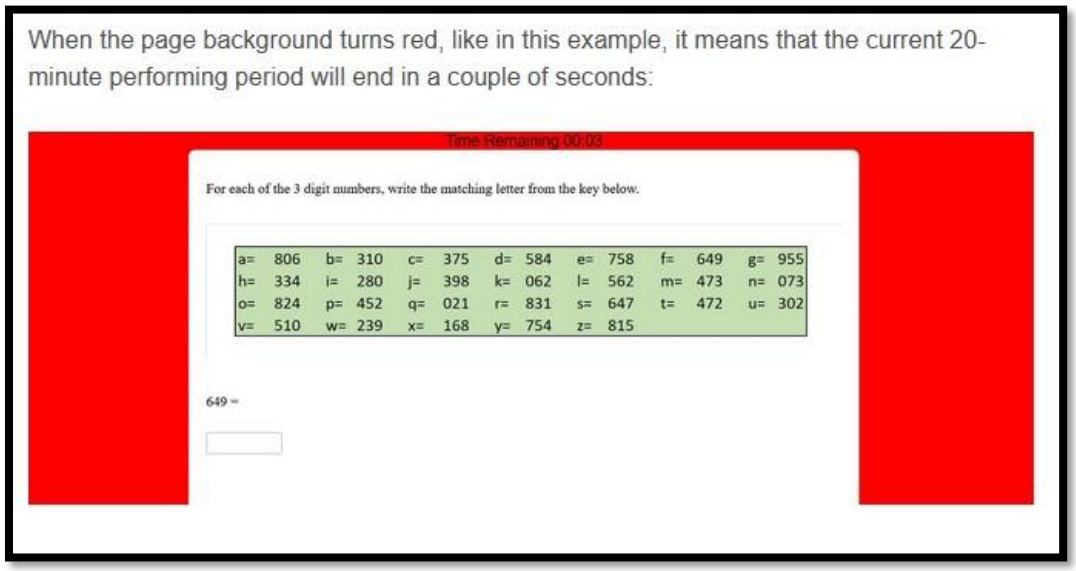
Screen 3



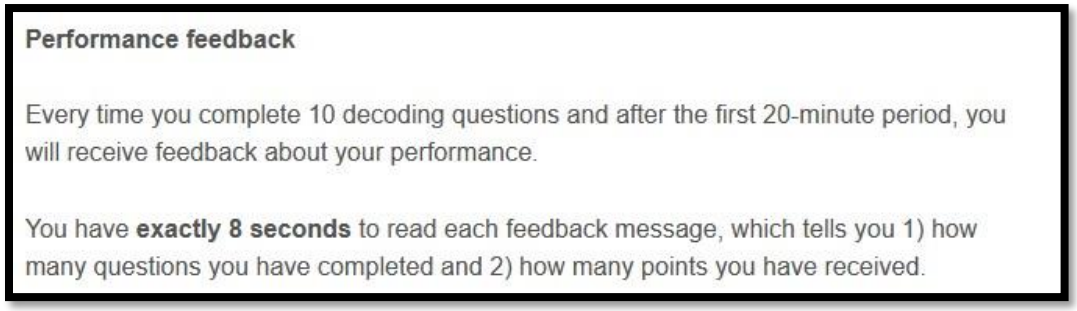
Screen 4



Screen 5

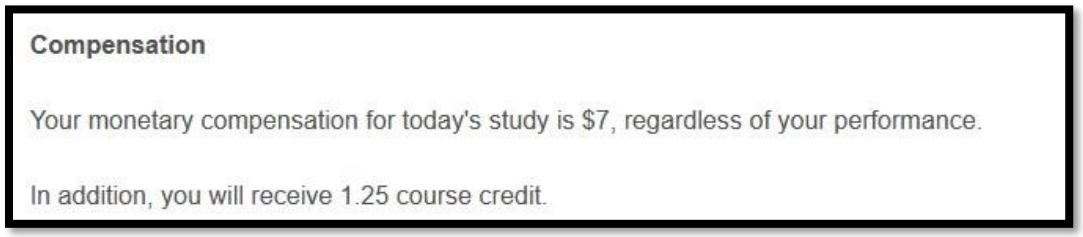


Screen 6



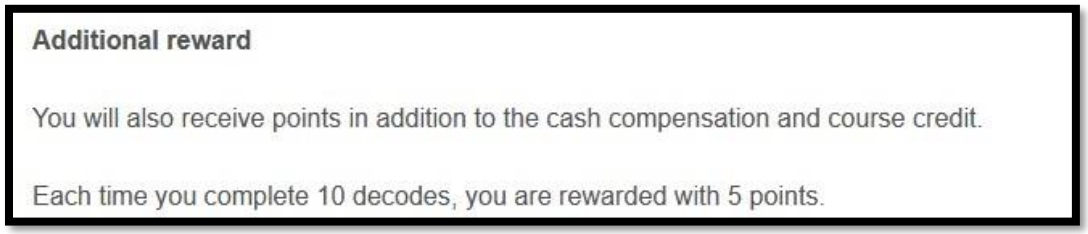
Compensation and Rewards

Screen 7

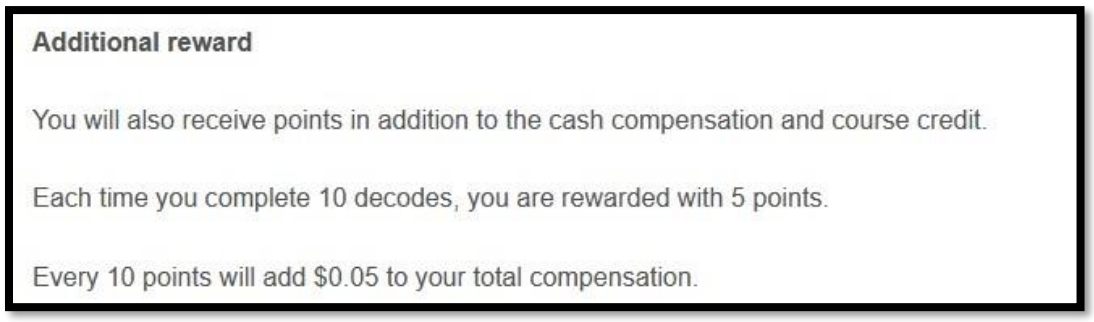


Independent Variables (Point Reward Unpredictability & Cash Value of Point Reward)

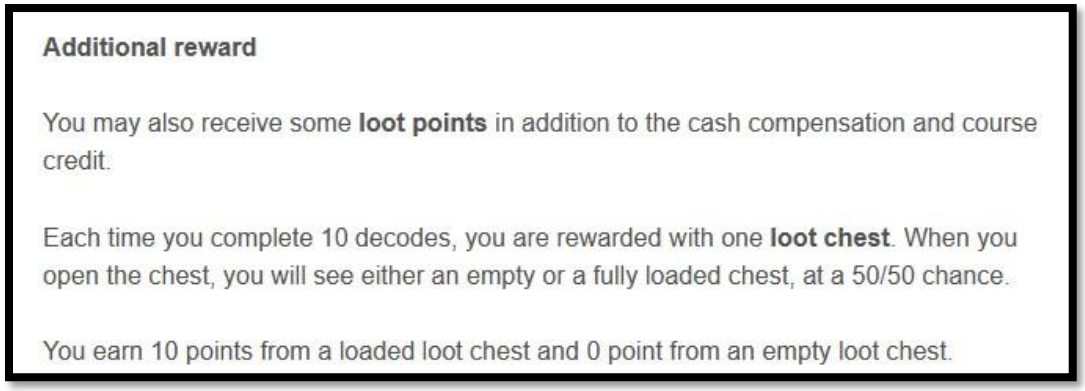
Screen 8– Fixed Point Rewards/ Cash Value of Point Reward (Absent) Conditions



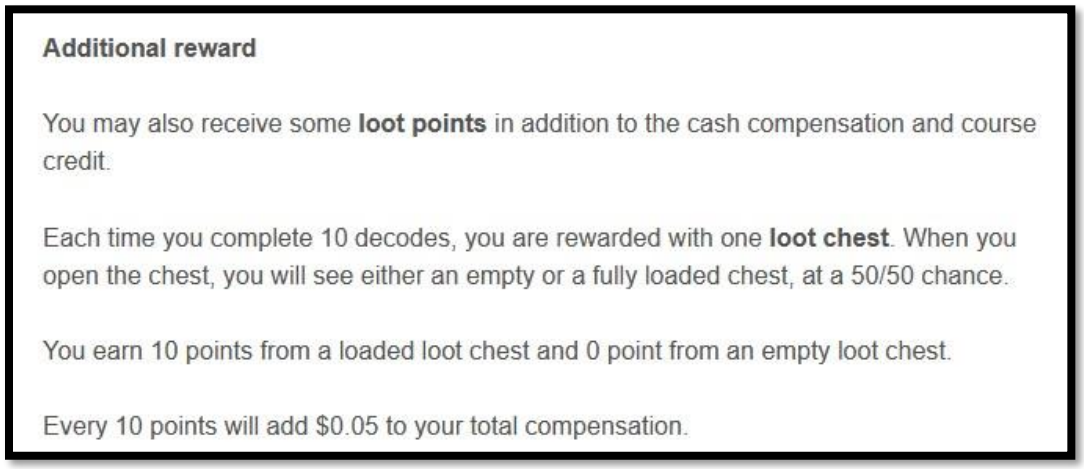
Screen 8 – Fixed Point Rewards/ Cash Value of Point Reward (Present) Conditions



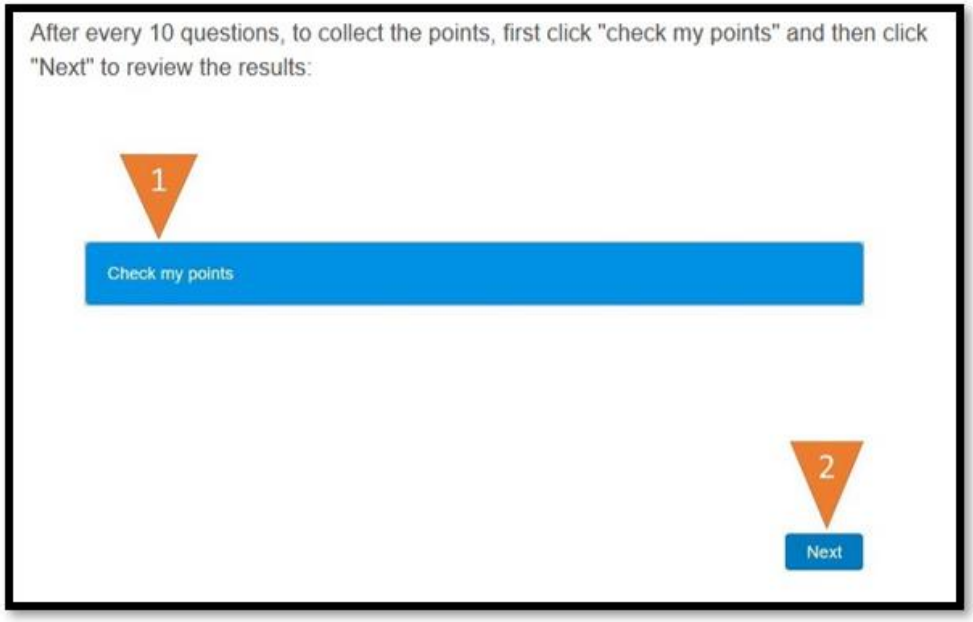
Screen 8– Loot Point Rewards/Cash Value of Point Reward (Absent) Conditions



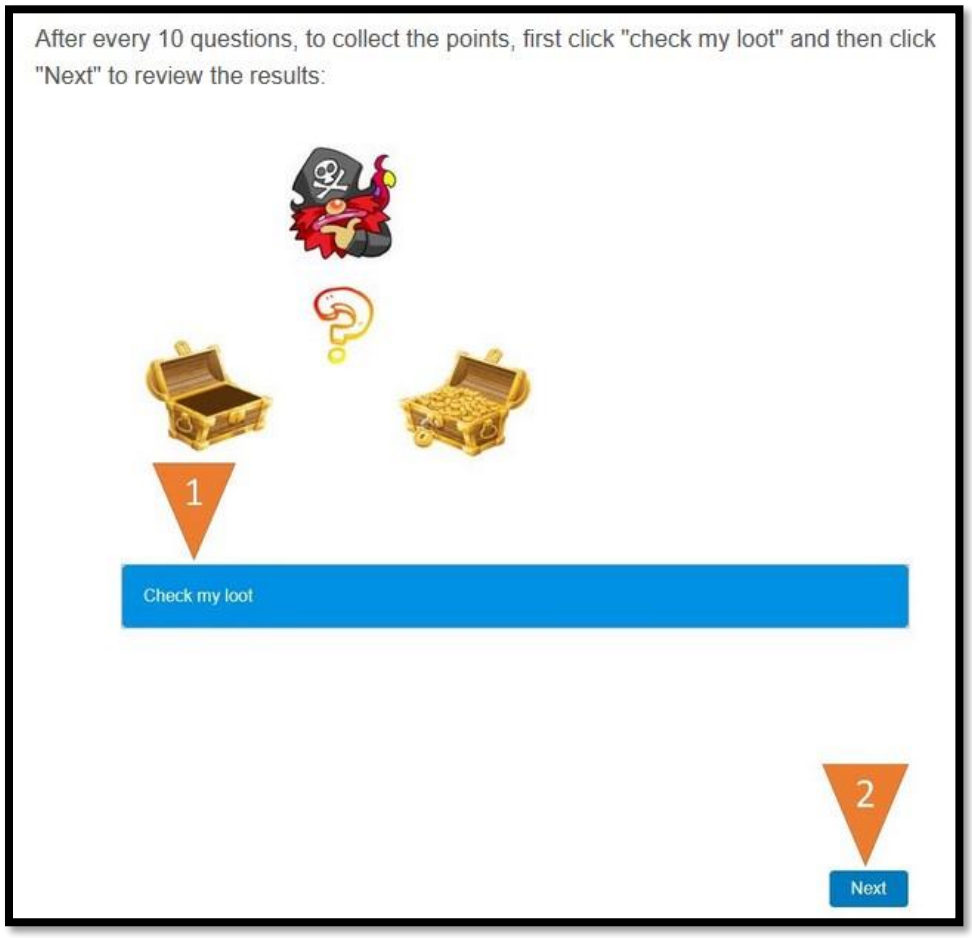
Screen 8 – Loot Point Rewards/Cash Value of Point Reward (Present) Conditions



Screen 9 – Fixed Point Rewards Conditions

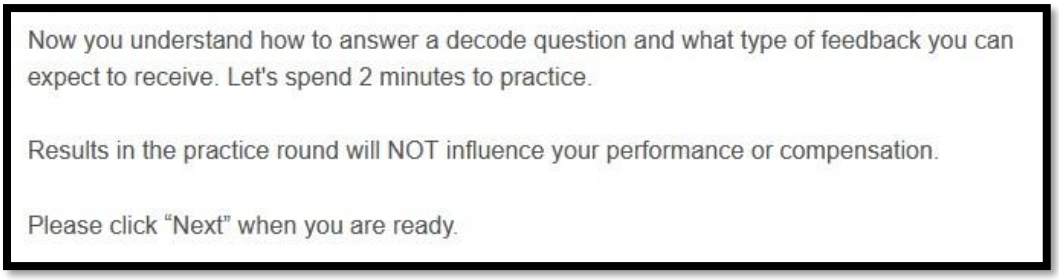


Screen 9 – Loot Point Rewards Conditions

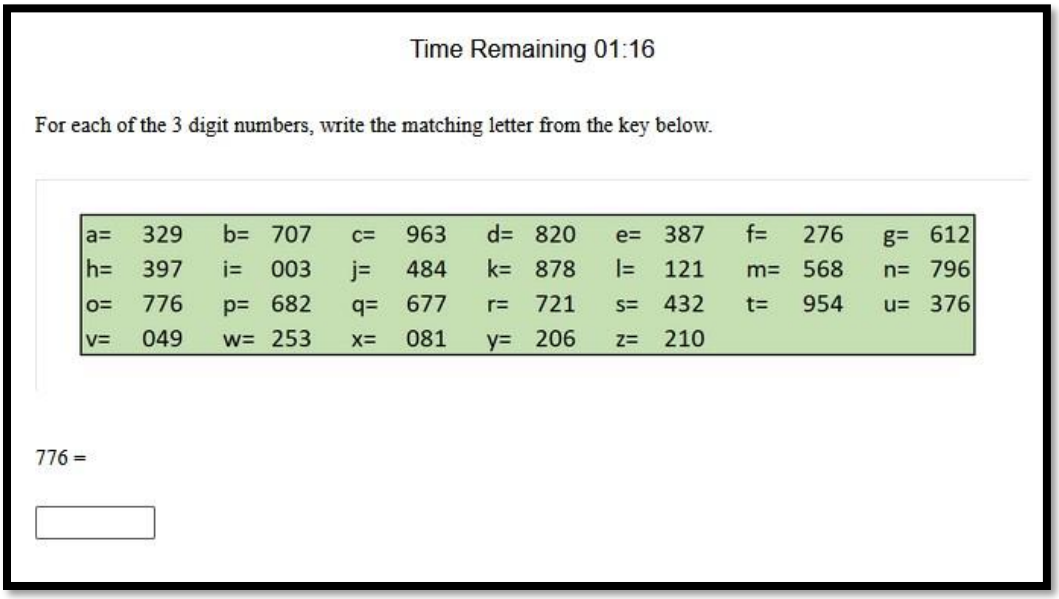


Practice Period

Screen 10

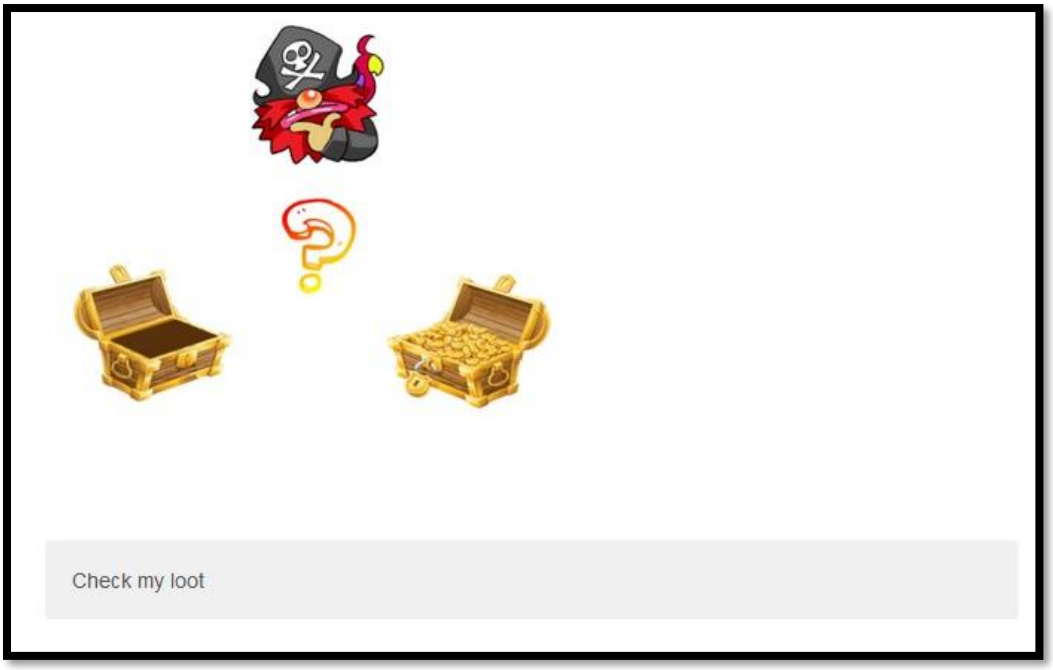


Screen 11

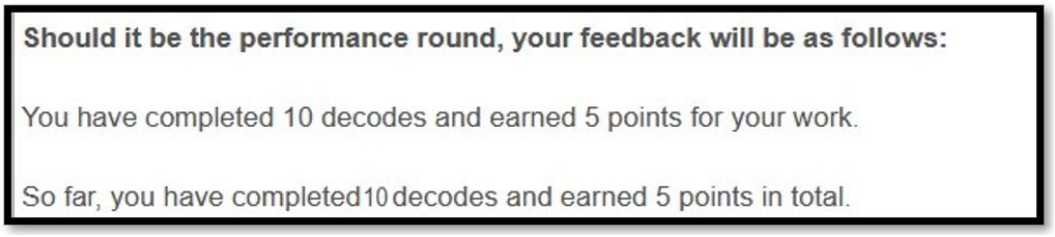


Screen 12 – Fixed Point Rewards Conditions

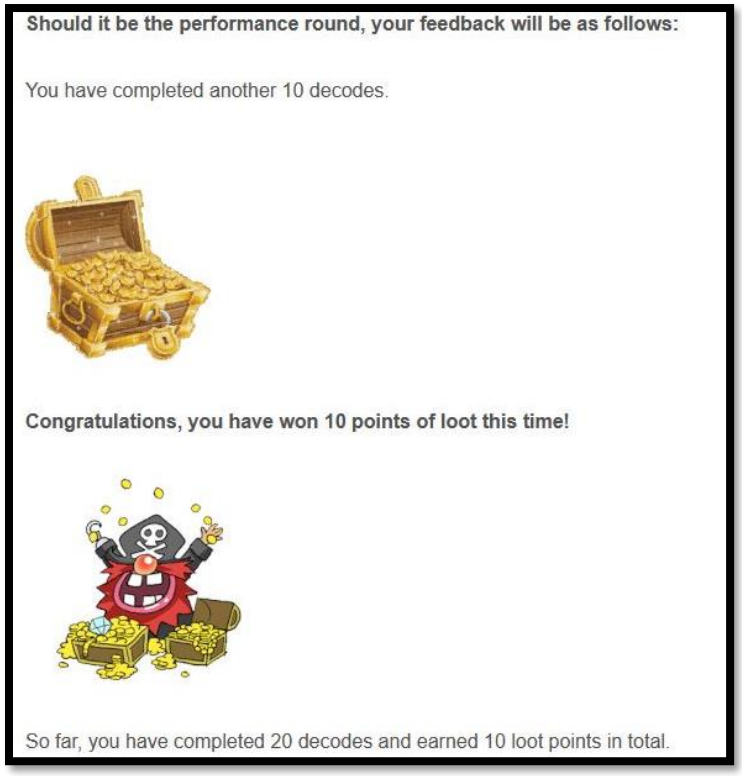
Screen 12 – Loot Point Rewards Conditions



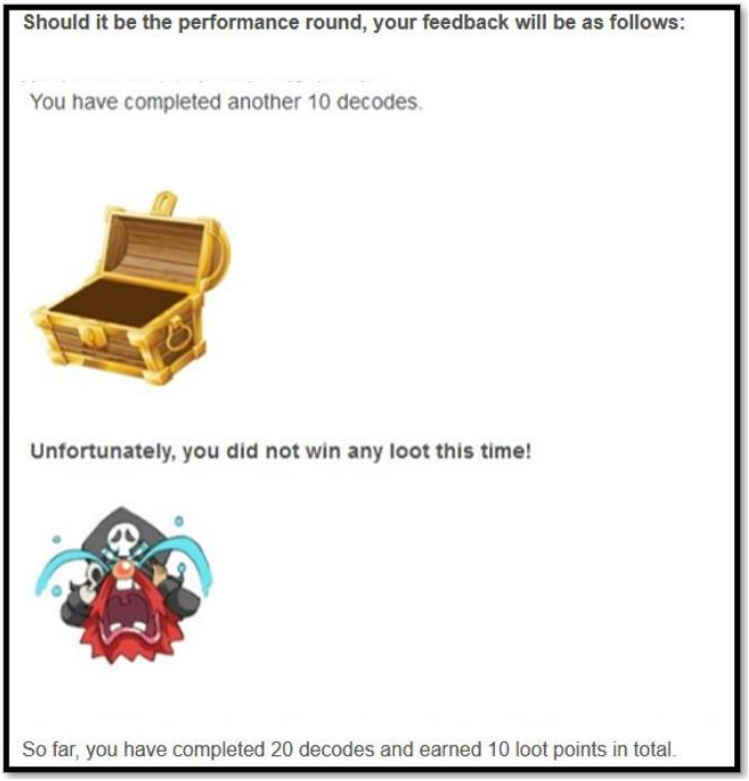
Screen 13 – Fixed Point Rewards Conditions



Screen 13 – Loot Point Rewards Conditions (Loot Gain)



Screen 13 – Loot Point Rewards Conditions (No Loot Gain)



Screen 14

Task Attractiveness Measure

Screen 15

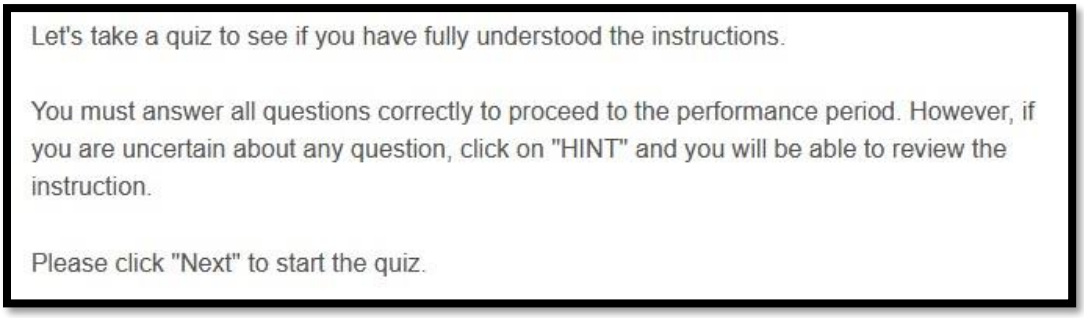
Fixed Point Rewards Conditions:

Loot Point Rewards Conditions:

All Conditions:

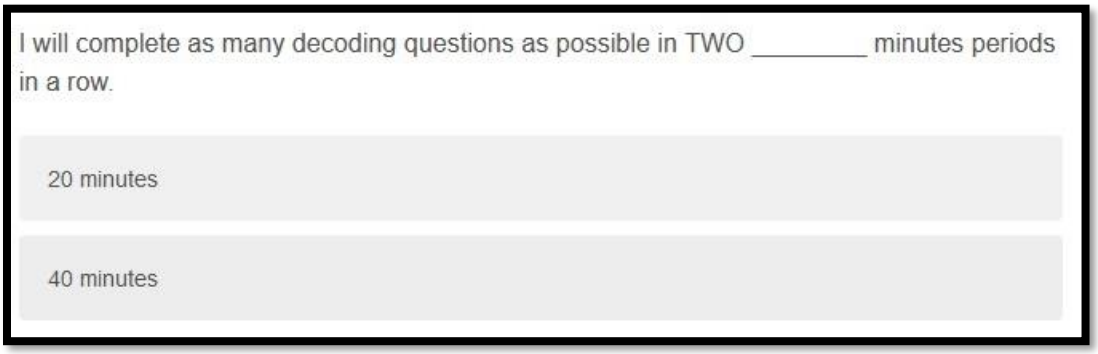
Comprehension Quiz

Screen 16

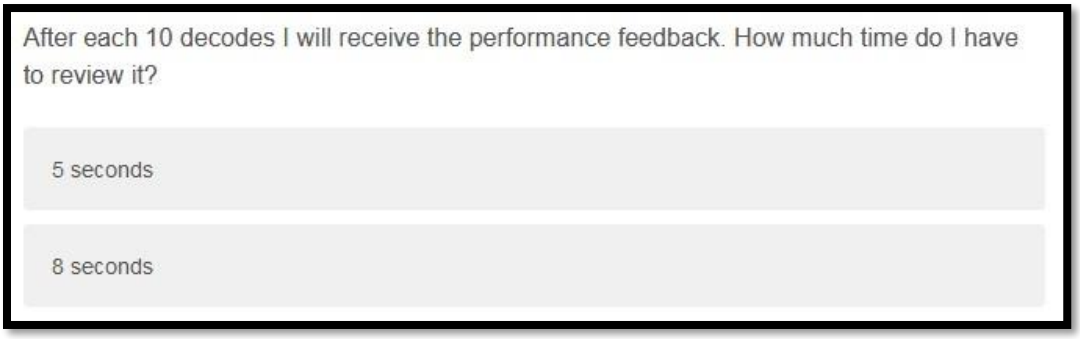


Screen 17

Screen 18



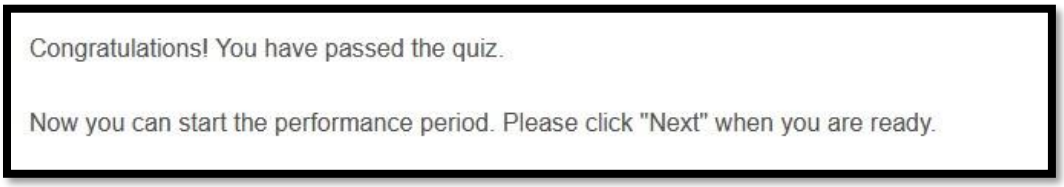
Screen 19



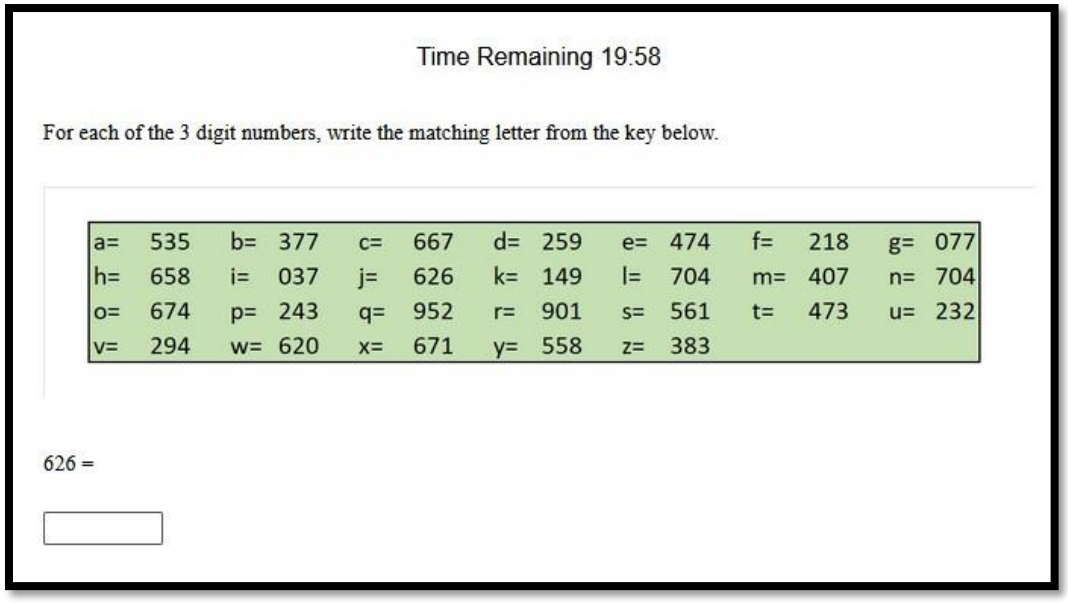
Screen 20 – Cash Value of Point Reward (Present) Conditions

Performance Periods

Screen 21

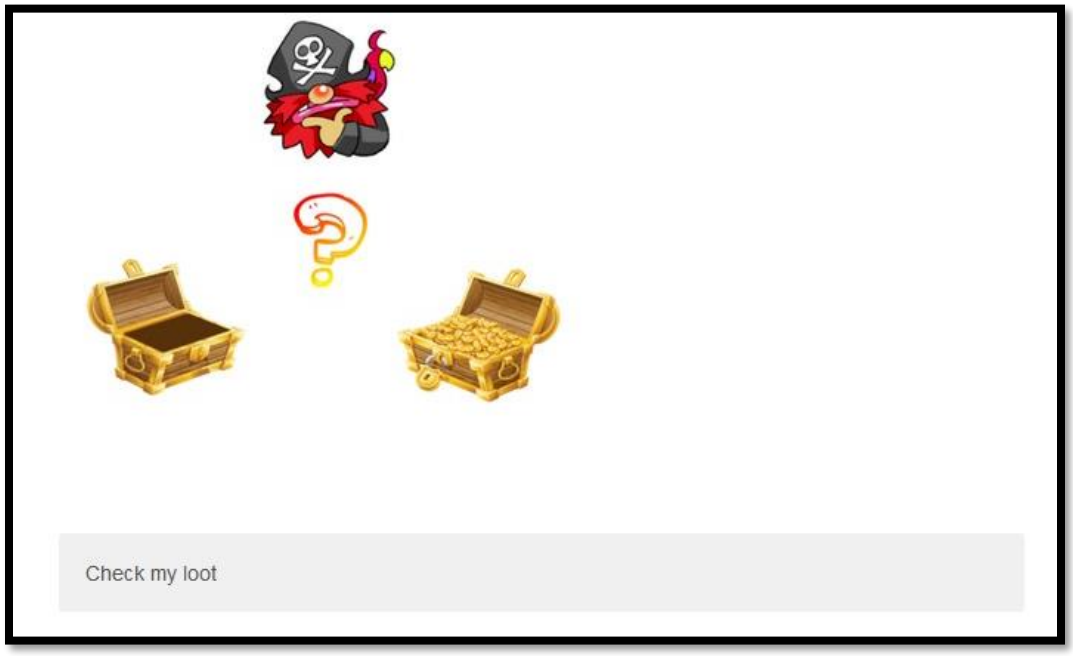


Screen 22



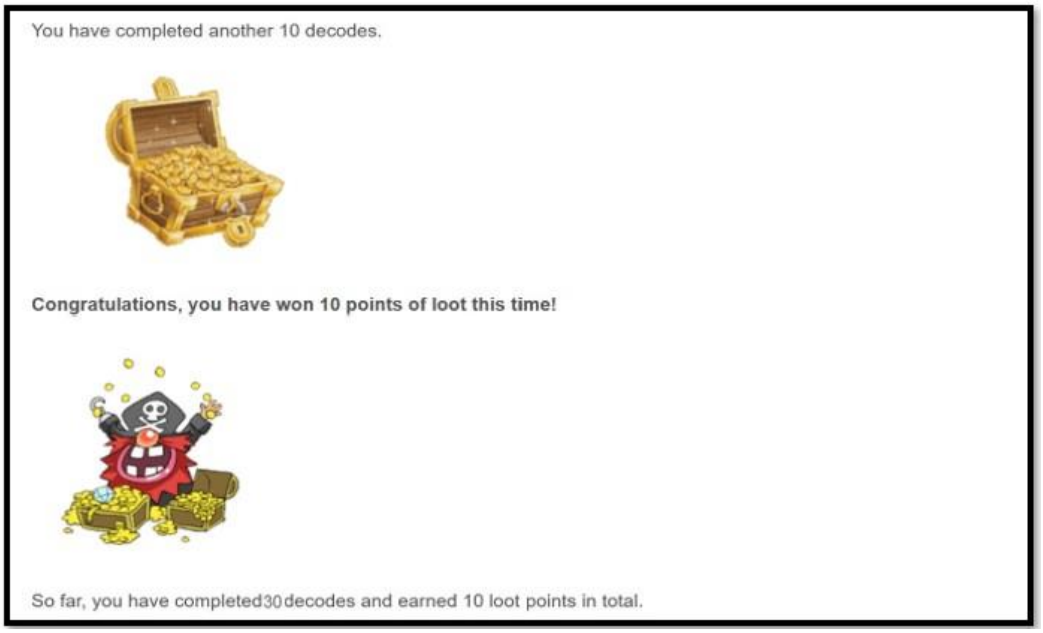
Screen 23 – Fixed Point Rewards Conditions

Screen 23 – Loot Point Rewards Conditions

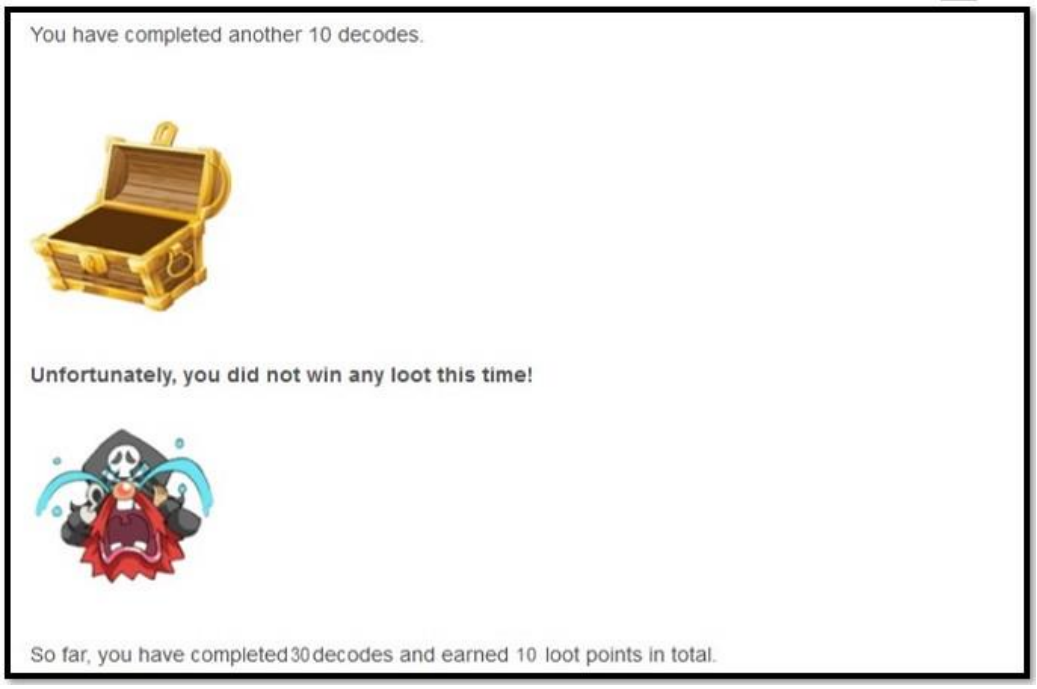


Screen 24 – Fixed Point Rewards Conditions

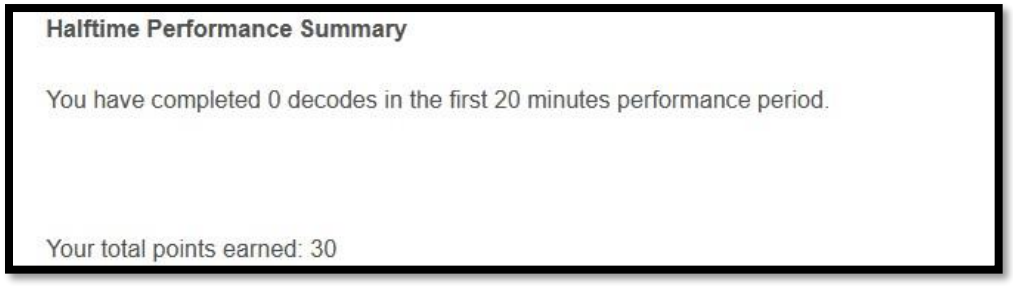
Screen 24 – Loot Point Rewards Conditions (Loot Gain)



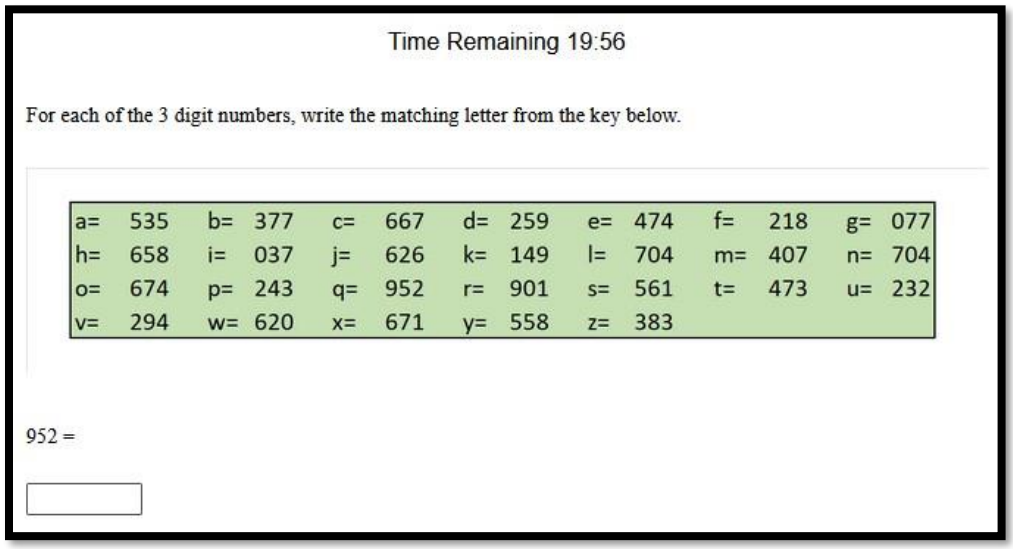
Screen 24 – Loot Point Rewards Conditions (No Loot Gain)



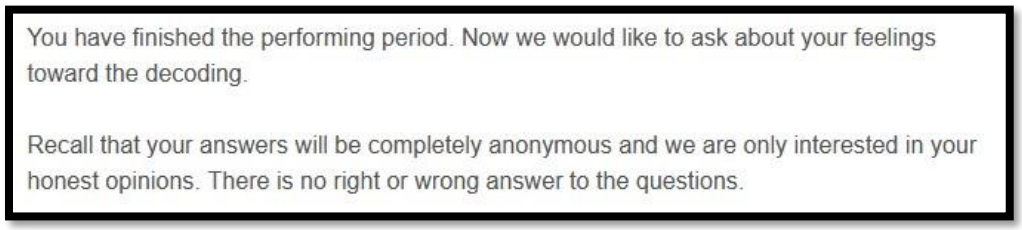
Screen 25



Screen 26

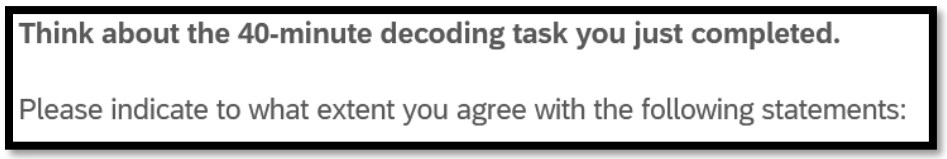


Screen 27



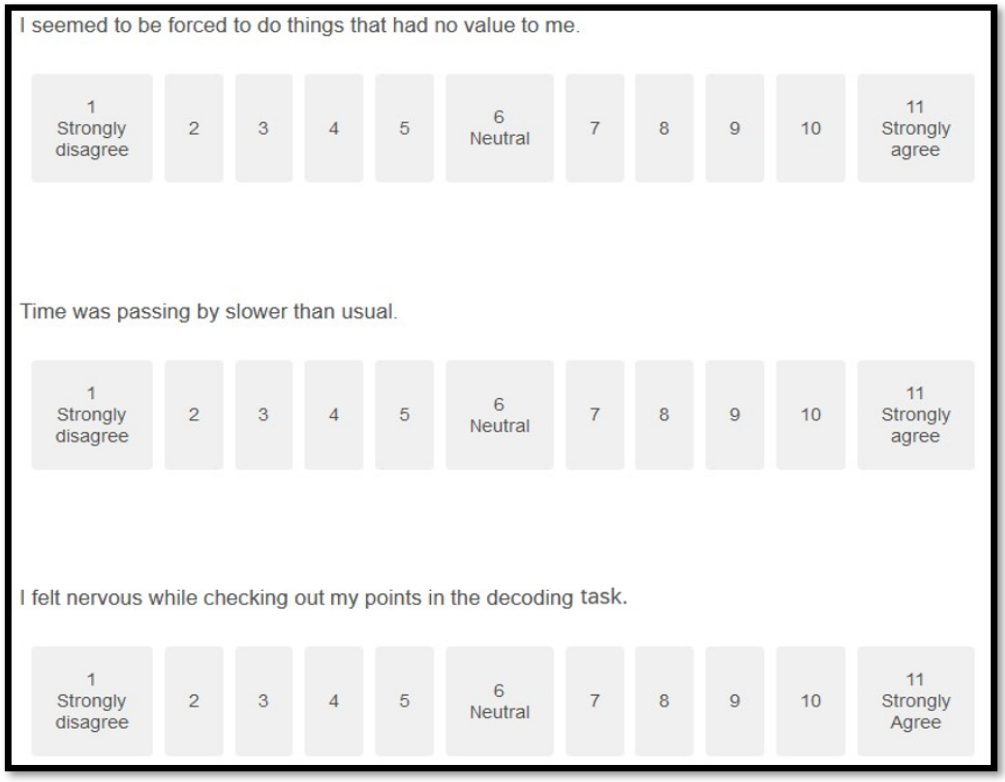
Post Experiment Questionnaire

Screen 28 – Fixed Point Rewards Conditions

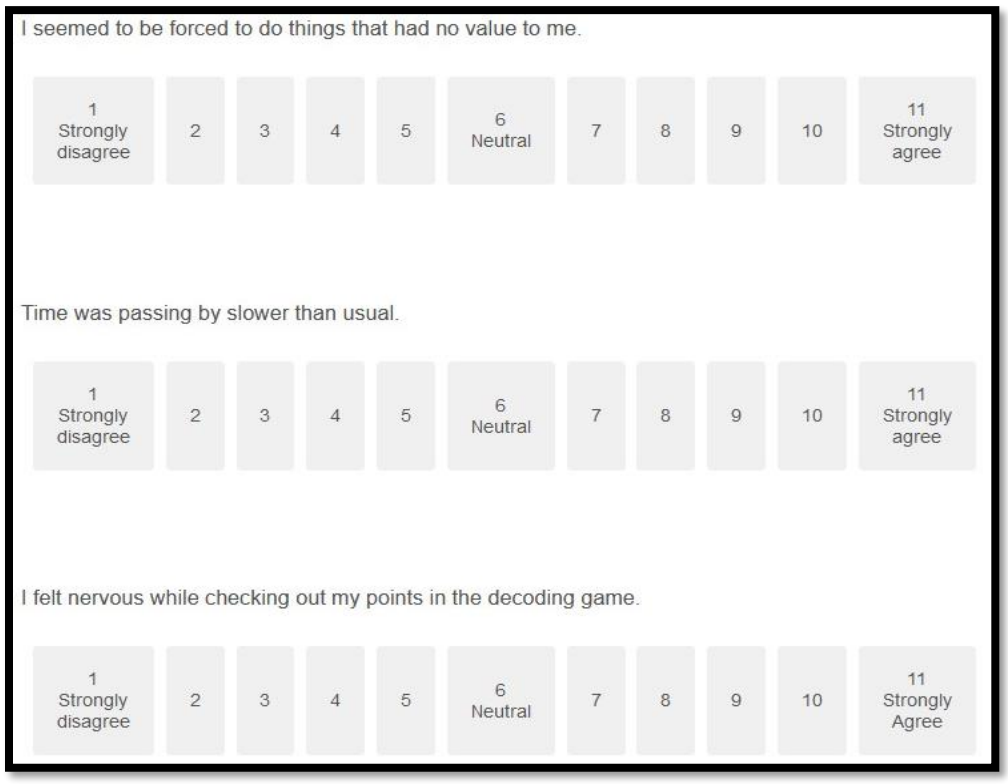


Screen 28 – Loot Point Rewards Conditions

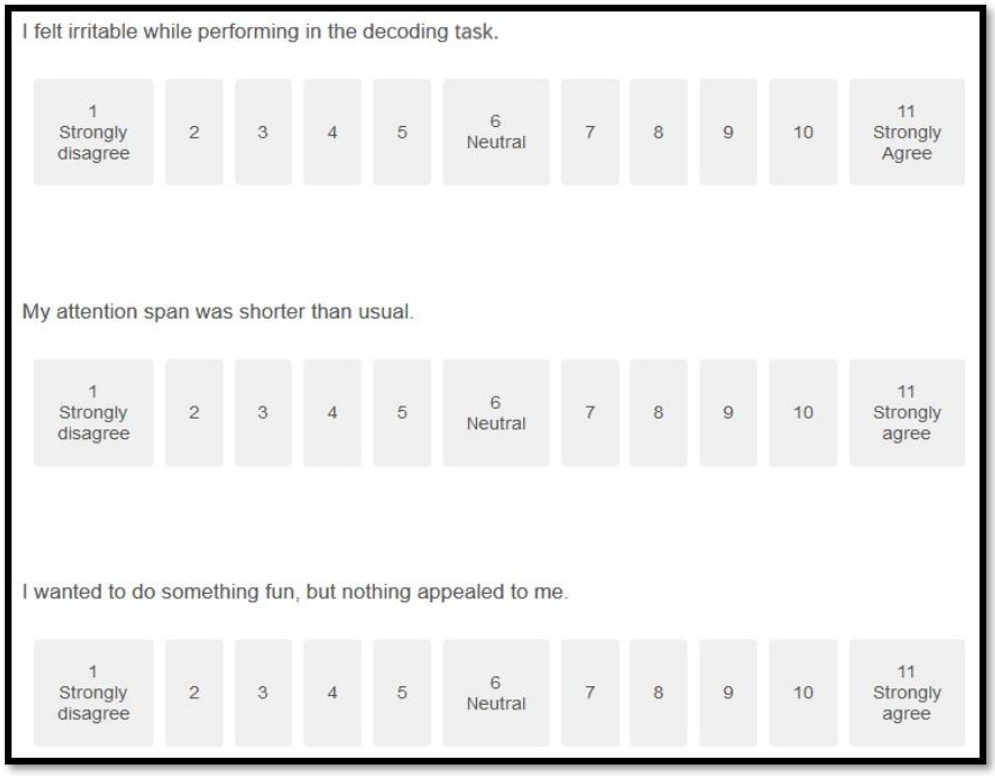
Screen 29 - Fixed Point Rewards Conditions



Screen 29 - Loot Point Rewards Conditions

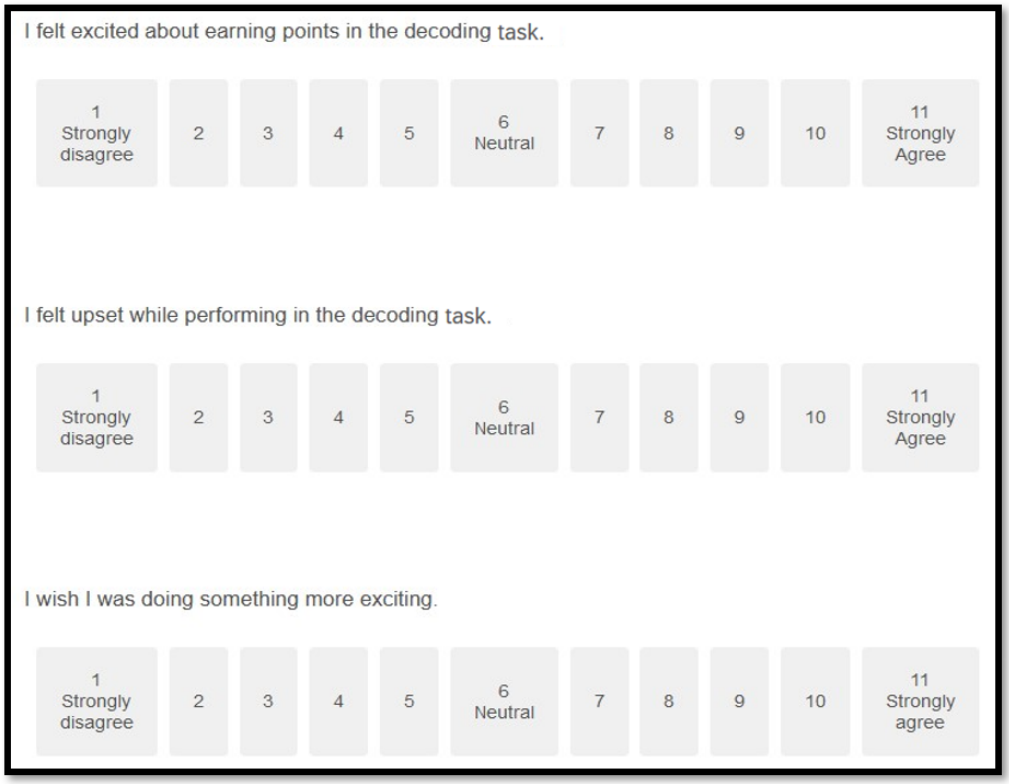


Screen 30 - Fixed Point Rewards Conditions



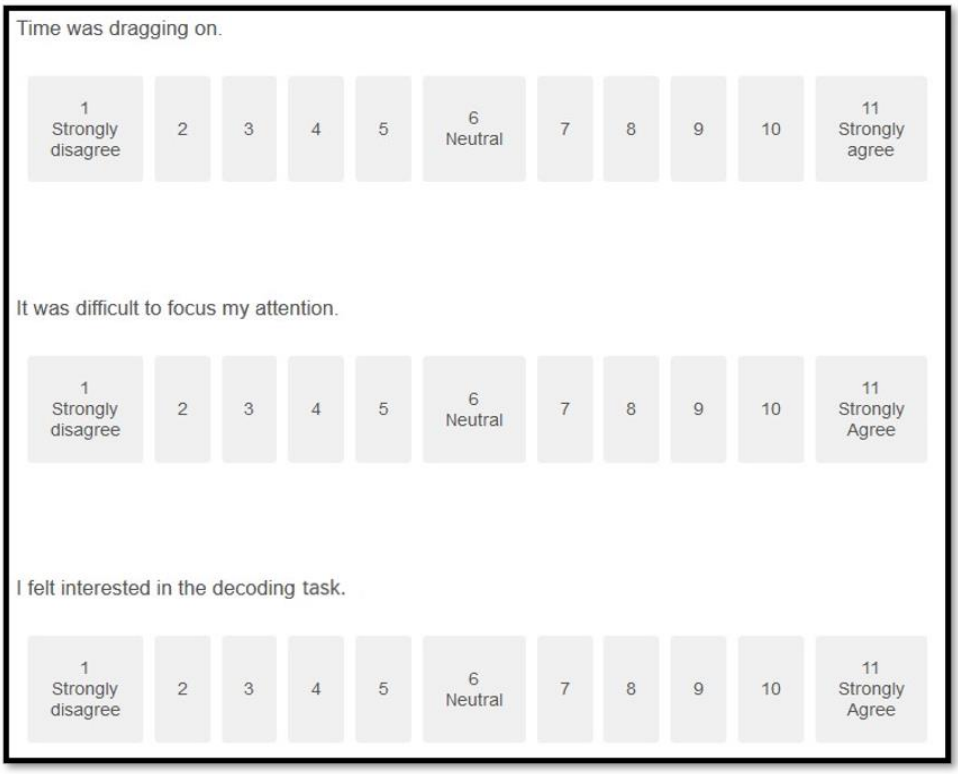
Screen 30 - Loot Point Rewards Conditions

Screen 31 - Fixed Point Rewards Conditions



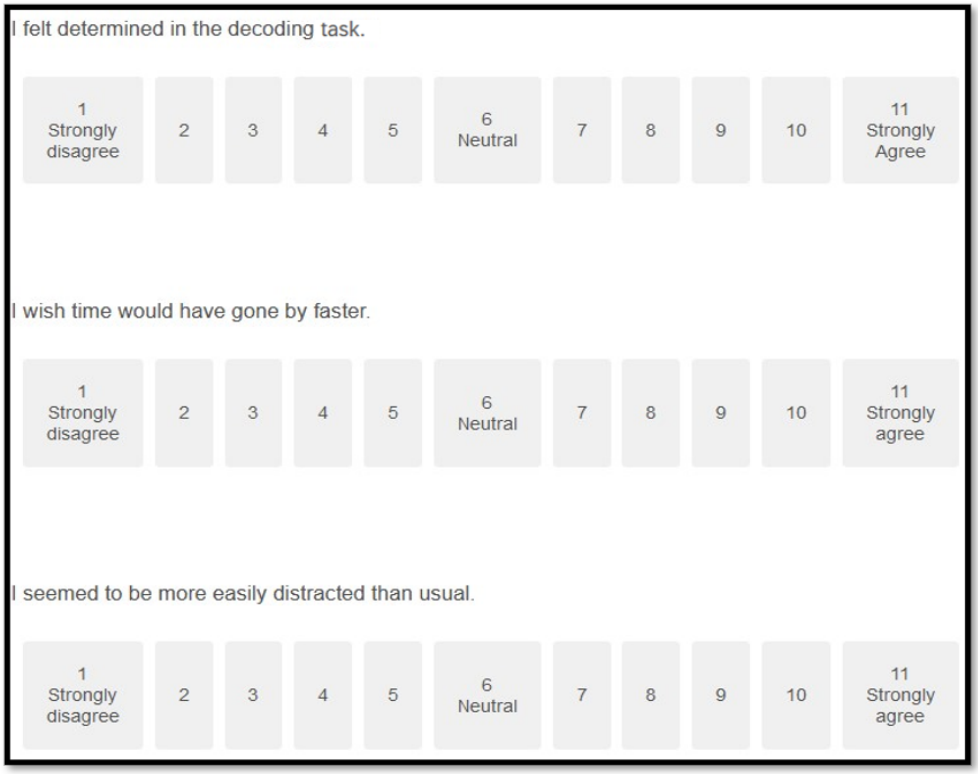
Screen 31 – Loot Point Rewards Conditions

Screen 32 - Fixed Point Rewards Conditions



Screen 32 - Loot Point Rewards Conditions

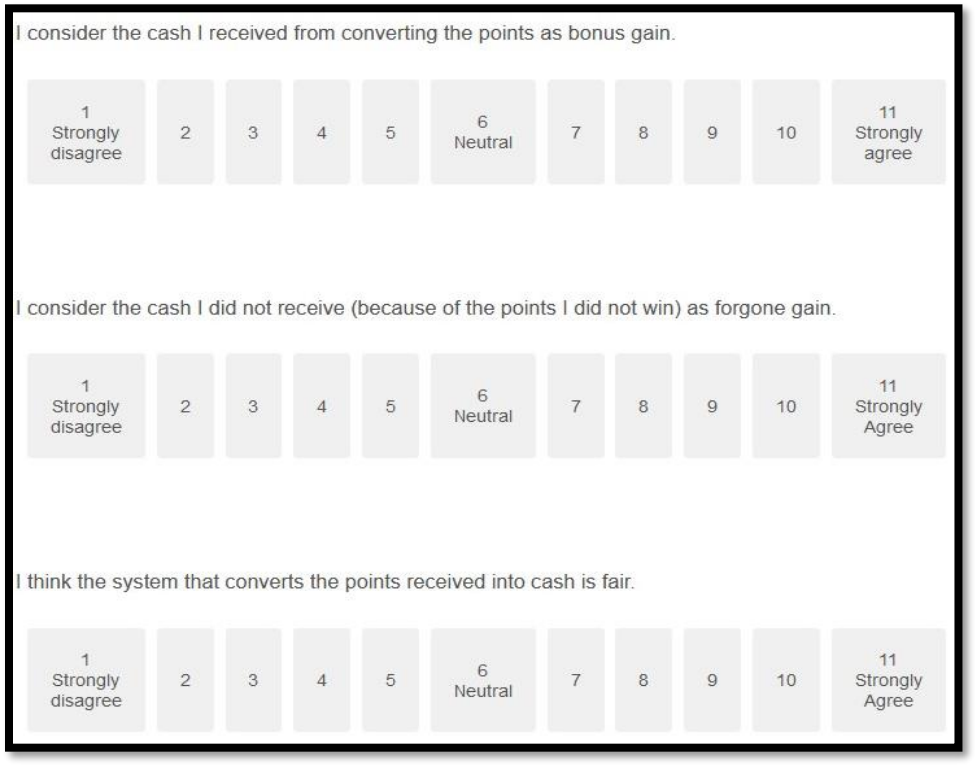
Screen 33 - Fixed Point Rewards Conditions



Screen 33 - Loot Point Rewards Conditions

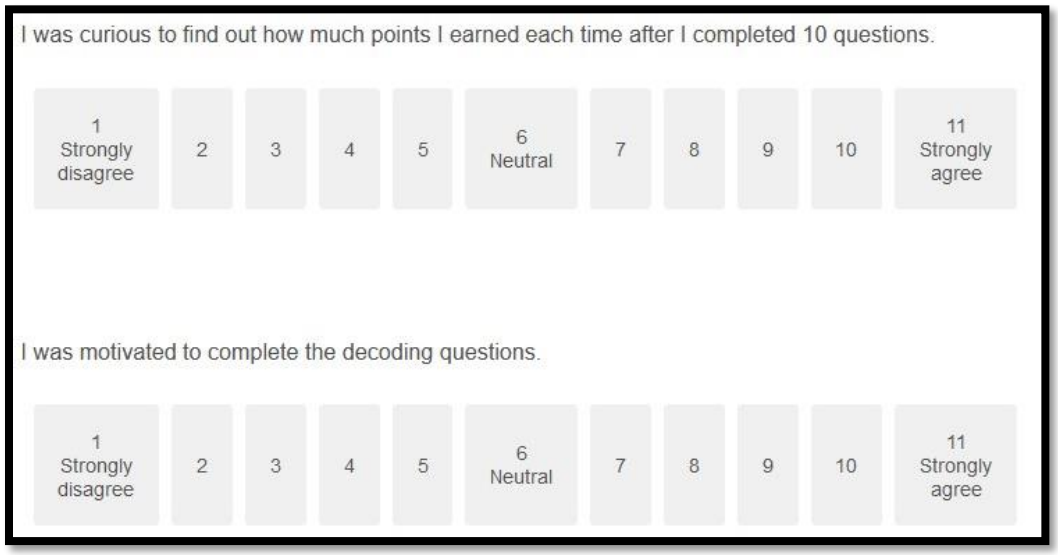
Screen 34

Screen 35 – Cash Value of Point Reward (Present) Conditions

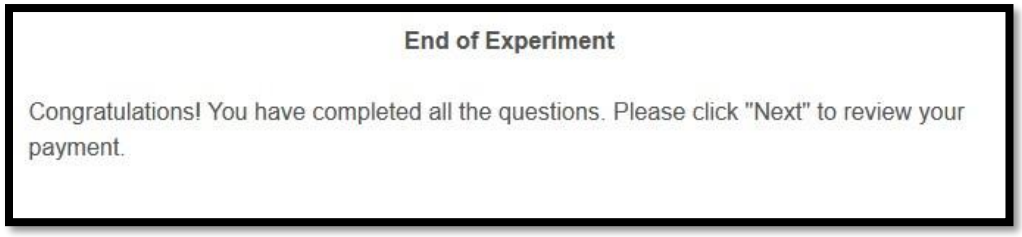


Screen 36

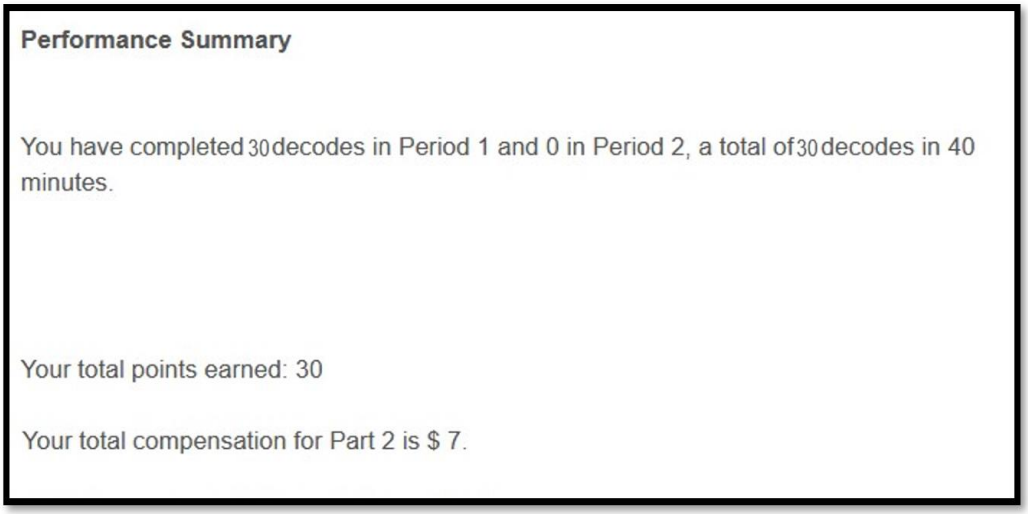
Screen 37



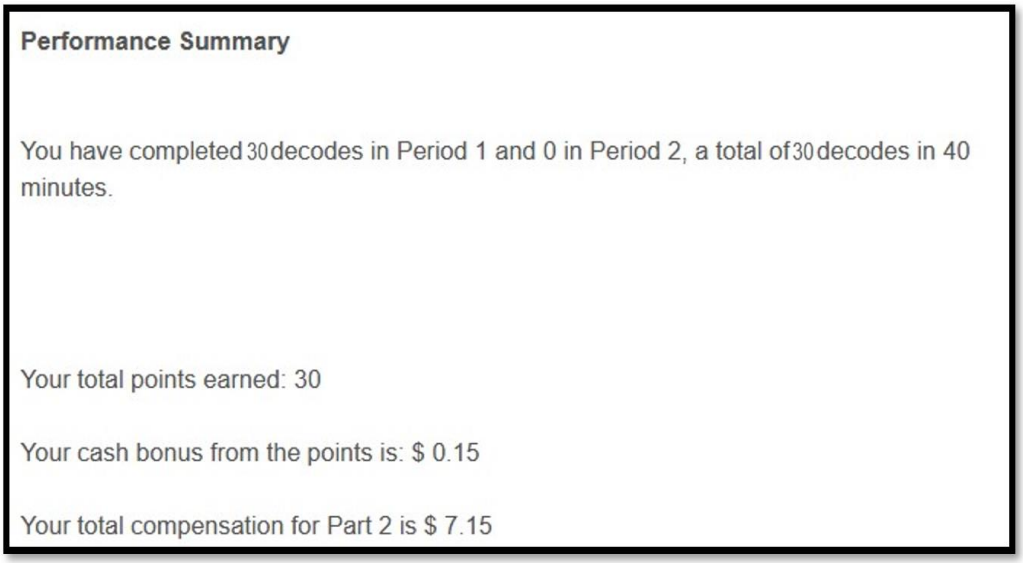
Screen 38



Screen 39 – Cash Value of Point Reward (Absent) Conditions



Screen 39 – Cash Value of Point Reward (Present) Conditions



Appendix 11. Informed Consent Statements

For Survey (Cash Value of Point Rewards: Absent)

Informed Consent Statement, Research in Management Accounting

You are invited to participate in a research study on employees' decision making. This research is being conducted by a PhD candidate Zhuoyi Zhao at Wilfrid Laurier University (under the supervision of Dr. Leslie Berger and Dr. Lan Guo at Wilfrid Laurier University).

INFORMATION

This study consists of two parts. Part I is to be completed immediately after this participation registration. In Part I, your task is to answer a survey. Approximately 200 participants are expected to participate in this study. This survey is expected to take 10 minutes of your time. Part II of the study will be completed at least one week later. You will complete Part II with a group of peer participants at the same time in a Zoom meeting setting. Part II will take about 60 minutes of your time.

RISKS AND BENEFITS

There are slight foreseeable psychological risks associated with this study. You may feel that the task is tedious. To mitigate the risk, please note that at any time during the study, you are free to choose the amount of effort to put into the task, and no personal identifiers will be associated with your performance information. Your performance will remain confidential. The results of this study are expected to benefit managers and employees within organizations.

CONFIDENTIALITY

Your confidentiality is ensured throughout the study. Part I is an online survey. No personal identifiers will be linked to your answers. In Part II, you will be joining the Zoom meeting with your SONA ID. To control the quality of data, the Zoom meeting will be in the video conference form. There will be **no recording** of any part of the Zoom meeting. The purpose of the Zoom meeting is for you to be aware of who else is in the study with you, like in a computer lab, and is not being used for any data analysis. So it is voluntary to unmute your audio or video. The responses you give to questions within our experiment constitutes the data we will analyze and will be maintained, with no personal identifiers, on a password-protected computer database with access restricted to the primary investigator. As well, the data will be electronically archived after completion of the study and maintained for a period of 5 years.

COMPENSATION

As an incentive, you will receive $2 for participating Part I. You will receive a bonus of $1 if you complete 100% of the questions in Part I. In Part II, you will receive $7 (including a show up fee of $2) and 1.25 course credits for 60 minutes of your time. If you withdraw from the study prior to completion of Part I, your remuneration is $2. You must complete Part I in order to participant in Part II. If you withdraw from the study prior to completing Part II, your remuneration is $4 or $5, a sum of your compensation from Part I and the show up fee of Part II. If you complete the entire study, you will receive $9 or $10 plus 1.25 course credits. After completing Part II, you will be paid in private through online monetary transfer (e.g., Interac) within 3 business days after we receive your e-transfer information (e.g., your Interac email). The amount received is taxable. It is the participants' responsibility to report this amount for income tax purposes.

CONTACT
If you have questions at any time about the study or the procedures, you may contact the researcher, Zhuoyi Zhao, at zhao3845@mylaurier.ca. This project has been reviewed and approved by the University Research Ethics Board (REB # 6170). If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. Jayne Kalmar, rebchair@wlu.ca, Chair, University Research Ethics Board, Wilfrid Laurier University, (519) 884-1970, extension 3131.

PARTICIPATION
Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study, every attempt will be made to remove your data from the study, and have it destroyed. You have the right to omit any question(s)/procedure(s) you choose.

FEEDBACK AND PUBLICATION
The results of this study will be disseminated in a journal article. If you wish to receive a copy of this article when it is published, please contact Zhuoyi Zhao at zhao3845@mylaurier.ca

For Zoom Meeting (Cash Value of Point Rewards: Absent)

Informed Consent Statement, Research in Management Accounting

You are invited to participate in a research study on employees' decision making. This research is being conducted by a PhD candidate Zhuoyi Zhao at Wilfrid Laurier University (under the supervision of Dr. Leslie Berger and Dr. Lan Guo at Wilfrid Laurier University).

INFORMATION
As a participant in Part II of this study, your task is to decode some letters, answer questions about your attitudes and reactions towards the task and provide some basic demographic information. Approximately 200 participants are expected to participate in this study. Part II is expected to take 60 minutes of your time.

RISKS AND BENEFITS
There are slight foreseeable psychological risks associated with this study. You may feel that the task is tedious. To mitigate the risk, please note that at any time during the study, you are free to choose the amount of effort to put into the task, and no personal identifiers will be associated with your performance information. Your performance will remain confidential. The results of this study are expected to benefit managers and employees within organizations.

CONFIDENTIALITY
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personal identifiers, on a password-protected computer database with access restricted to the primary investigator. As well, the data will be electronically archived after completion of the study and maintained for a period of 5 years.

COMPENSATION

As an incentive, you have earned $2 or 3 for participating in Part I and will be given $7 in Part II of the study (including a show up fee of $2) plus 1.25 course credits for 60 minutes of your time. If you withdraw from the study prior to completing Part II, your remuneration is $4 or $5, a sum of your compensation from Part I and the show up fee of Part II. If you complete the entire study, you will receive $9 or $10 plus 1.25 course credits. After completing Part II, you will be paid in private through online monetary transfer (e.g., Interac) within 3 business days after we receive your e-transfer information (e.g., your Interac email). The amount received is taxable. It is the participants' responsibility to report this amount for income tax purposes.

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FEEDBACK AND PUBLICATION

The results of this study will be disseminated in a journal article. If you wish to receive a copy of this article when it is published, please contact Zhuoyi Zhao at zhao3845@mylaurier.ca

For Survey (Cash Value of Point Rewards: Present)

Informed Consent Statement, Research in Management Accounting

You are invited to participate in a research study on employees' decision making. This research is being conducted by a PhD candidate Zhuoyi Zhao at Wilfrid Laurier University (under the supervision of Dr. Leslie Berger and Dr. Lan Guo at Wilfrid Laurier University).

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This study consists of two parts. Part I is to be completed immediately after this participation registration. In Part I, your task is to answer a survey. Approximately 200 participants are expected to participate in this study. This survey is expected to take 10 minutes of your time. Part II of the study will be completed at least one week later. You will complete Part II with a group of peer participants at the same time in a Zoom meeting setting. Part II will take about 60 minutes of your time.

RISKS AND BENEFITS
There are slight foreseeable psychological risks associated with this study. You may feel that the task is tedious. To mitigate the risk, please note that at any time during the study, you are free to choose the amount of effort to put into the task, and no personal identifiers will be associated with your performance information. Your performance will remain confidential. The results of this study are expected to benefit managers and employees within organizations.

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As an incentive, you will receive $2 for participating Part I. You will receive a bonus of $1 if you complete 100% of the questions in Part I. In Part II, you will receive $7 (including a show up fee of $2) and 1.25 course credits for 60 minutes of your time. During Part II, you may also receive some points, which can be converted into cash at the end of the session. You will receive $0.05 for every 10 points. The minimal cash amount you can get is $0 and the maximum is $2.3. If you withdraw from the study prior to completion of Part I, your remuneration is $2. You must complete Part I in order to participant in Part II. If you withdraw from the study prior to completing Part II, your remuneration is $4 or $5, a sum of your compensation from Part I and the show up fee of Part II. If you complete the entire study, on average you will receive $9.5 or$10.5 plus 1.25 course credits. After completing Part II, you will be paid in private through online monetary transfer (e.g., Interac) within 3 business days after we receive your e-transfer information (e.g., your Interac email). The amount received is taxable. It is the participants' responsibility to report this amount for income tax purposes.

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FEEDBACK AND PUBLICATION
The results of this study will be disseminated in a journal article. If you wish to receive a copy of this article when it is published, please contact Zhuoyi Zhao at zhao3845@mylaurier.ca

For Zoom Meeting (Cash Value of Point Rewards: Present)

Informed Consent Statement, Research in Management Accounting

You are invited to participate in a research study on employees' decision making. This research is being conducted by a PhD candidate Zhuoyi Zhao at Wilfrid Laurier University (under the supervision of Dr. Leslie Berger and Dr. Lan Guo at Wilfrid Laurier University).

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FEEDBACK AND PUBLICATION

The results of this study will be disseminated in a journal article. If you wish to receive a copy of this article when it is published, please contact Zhuoyi Zhao at zhao3845@mylaurier.ca

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